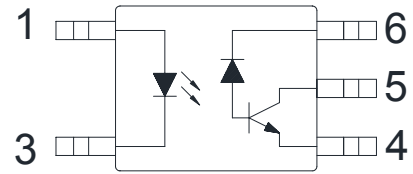


### ● Description

The KPC457 series consist of a LED. It is a high-speed digital output type photocoupler. And it is packaged in a 5pin mini-flat package.

### ● Schematic



- 1. Anode
- 3. Cathode
- 4. GND(Emitter)
- 5. Vo (Open collector)
- 6. Vcc

### ● Features

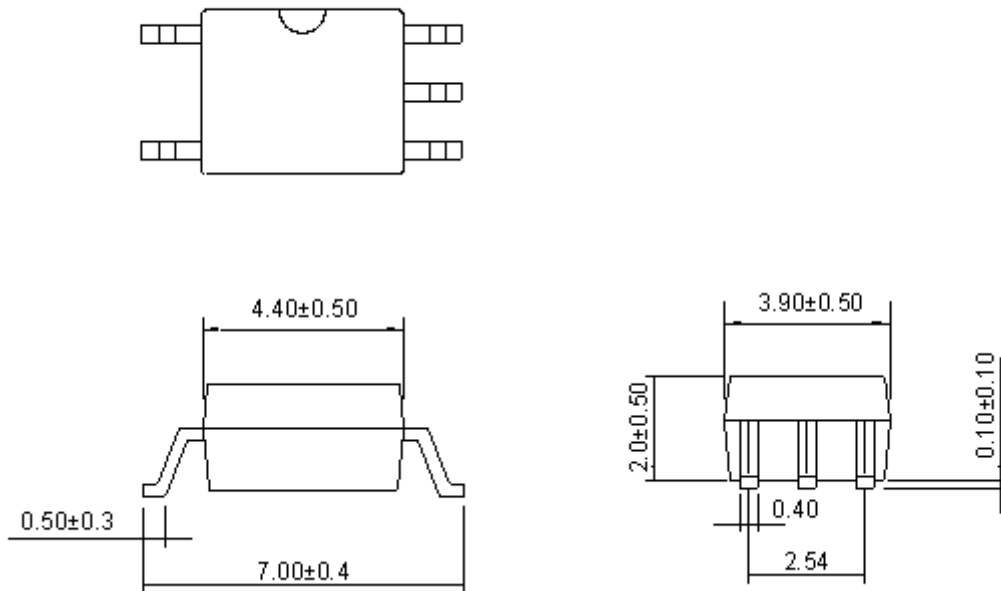
1. Pb free and RoHS compliant
2. 5 pin mini-flat package
3. High speed response (tPLH:typ.0.2us, tPHL:typ.0.4us)
4. High instantaneous common mode rejection voltage ( $C_{MH}$ : Min. 15KV/us,  $C_{ML}$ : Min. -15KV/us)
5. High isolation voltage between input and output (Viso: 3750Vrms)
6. MSL class 1
7. Agency Approvals:
  - UL Approved (No. E169586): UL1577
  - c-UL Approved (No. E169586)
  - 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

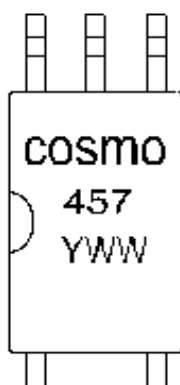
● **Outside Dimension**

Unit : mm



TOLERANCE:  $\pm 0.2$ mm

● **Device Marking**



**Notes:**

cosmo

457

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) | $I_{FM}$  | 200         | mA   |
|                                  | Reverse voltage           | $V_R$     | 5           | V    |
|                                  | Power dissipation         | $P_D$     | 45          | mW   |
| Output                           | Supply voltage            | $V_{CC}$  | -0.5 to +30 | V    |
|                                  | Output voltage            | $V_{OIL}$ | -0.5 to +20 | V    |
|                                  | Output current            | $I_{OL}$  | 8           | mA   |
|                                  | Power dissipation (*3)    | $P_O$     | 100         | mW   |
| Total power dissipation (*3)     |                           | $P_{tot}$ | 100         | mW   |
| Isolation voltage 1 minute (*4)  |                           | $V_{iso}$ | 3750        | Vrms |
| Operating temperature            |                           | $T_{opr}$ | -55 to +85  | °C   |
| Storage temperature              |                           | $T_{stg}$ | -55 to +125 | °C   |
| Soldering temperature 10 seconds |                           | $T_{sol}$ | 260         | °C   |

\*1 When ambient temperature goes above 70°C, the power dissipation goes down at 0.8mA/°C.

\*2 When ambient temperature goes above 70°C, the power dissipation goes down at 1.5mW/°C.

\*3 When ambient temperature goes above 70°C, the power dissipation goes down at 1.8mW/°C.

\*4 40 to 80%RH AC for 1 minute=60HZ.

### ● Electro-optical Characteristics

(Ta= 25°C)

| Parameter                |   | Symbol       | Conditions  | Min.                          | Typ.               | Max. | Unit     |
|--------------------------|---|--------------|---|-------------------------------|--------------------|------|----------|
| Input                    | Forward voltage   | $V_F$        | $I_F=16mA$  | -                             | 1.7                | 1.95 | V        |
|                          | Reverse current   | $I_R$        | $V_R=5V$  | -                             | -                  | 10   | uA       |
|                          | Terminal capacitance  | $C_t$        | $V=0, f=1MHz$   | -                             | 60                 | 250  | pF       |
| Output                   | High level output current (1)                                   | $I_{OH}(1)$  | $I_F=0, V_{CC}=5.5V, V_O=5.5V$                        | -                             | 3                  | 500  | nA       |
|                          | High level output current (2)                                   | $I_{OH}(2)$  | $I_F=0, V_{CC}=15V, V_O=15V$                          | -                             | -                  | 1.0  | uA       |
|                          | High level output current (3) (*6)                              | $I_{OH}(3)$  |   | -                             | -                  | 50   | uA       |
|                          | High level supply current (1)                                   | $I_{CCH}(1)$ |   | $I_F=0, V_{CC}=15V, V_O=Open$ | -                  | 0.02 | 1.0      |
|                          | High level supply current (2) (*6)                              | $I_{CCH}(2)$ | -   |                               | -                  | 2.0  | uA       |
|                          | Low level supply current  | $I_{CCL}$    | $I_F=16mA, V_{CC}=15V, V_O=Open$                      | -                             | 120                | -    | uA       |
|                          | Low level supply voltage  | $V_L$        | $I_F=16mA, V_{CC}=4.5V, I_O=2.4mA$                    | -                             | -                  | 0.4  | V        |
| Transfer Characteristics | Current transfer ratio (1)                                      | $CTR(1)$     | $I_F=16mA, V_{CC}=4.5V, V_O=0.4V, R_L=1.9K\Omega$     | 19                            | -                  | 50   | %        |
|                          | Current transfer ratio (2) (*6)                                 | $CTR(2)$     |   | 15                            | -                  | -    | %        |
|                          | Isolation resistance  | $R_{ISO}$    | $DC=500V, 40\text{ to }60\%RH$                        | $5 \times 10^{10}$            | $1 \times 10^{11}$ | -    | $\Omega$ |
|                          | Floating capacitance  | $C_f$        | $V=0, f=1MHz$   | -                             | 0.6                | 1.0  | pF       |
|                          | “High-->Low” propagation delay time                             | $t_{PHL}$    | $I_F=16mA, V_{CC}=5V, R_L=1.9K\Omega$                 | -                             | 0.2                | 0.8  | us       |
|                          | “High-->Low” propagation delay time                             | $t_{PLH}$    |   | -                             | 0.4                | 0.8  | us       |
|                          | Instantaneous common mode rejection voltage (High level output) | $C_{MH}$     | $I_F=0, V_{CC}=5V, V_{CM}=1.0KV(p-p), R_L=1.9K\Omega$ | 15                            | 30                 | -    | KV/us    |



# KPC457 Series

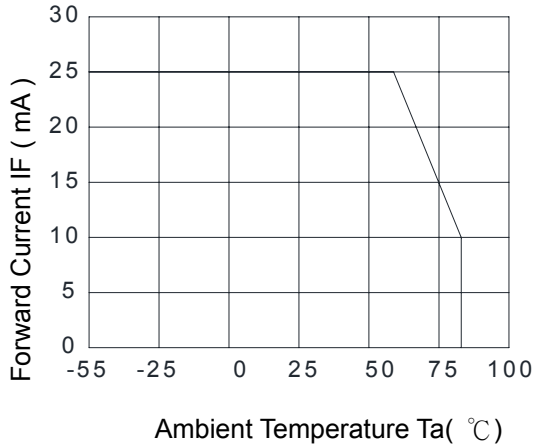
## 5PIN HIGH-SPEED OUTPUT PHOTOCOUPLER

|  |   |          |  |     |     |   |       |
|--|---|----------|--|-----|-----|---|-------|
|  | Instantaneous common mode rejection voltage (High level output) | $C_{ML}$ | $I_F=16mA, V_{CC}=5V,$<br>$V_{CM}=1.0KV(p-p),$<br>$R_L=1.9K\Omega$ | -15 | -30 | - | KV/us |
|--|---|----------|--|-----|-----|---|-------|

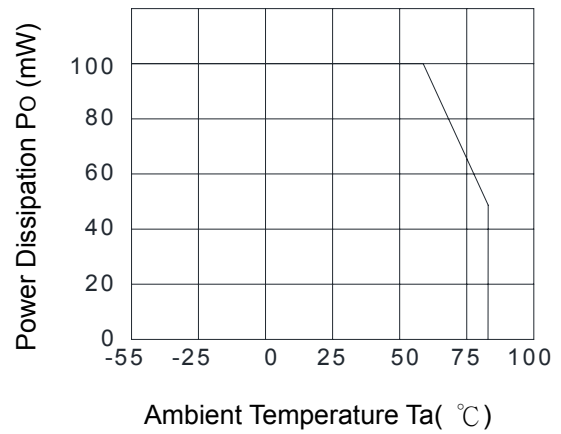
\*5 It shall connect a by-pass capacitor of 0.01uF or more between Vcc (pin 6) and GND(pin 4) near the device ,when it measures transfer characteristics and the output side characteristics.

\*6 Ta=0 to 70°C.

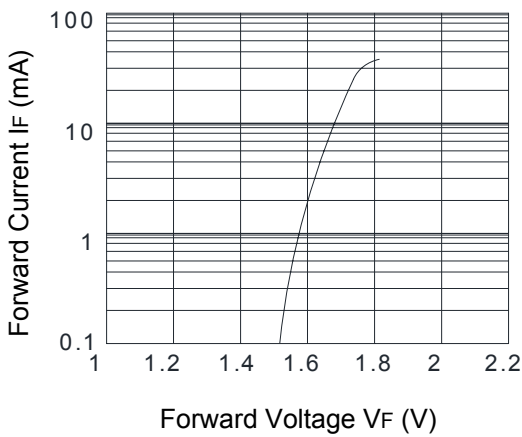
**Fig.1 Forward Current vs. Ambient Temperature**



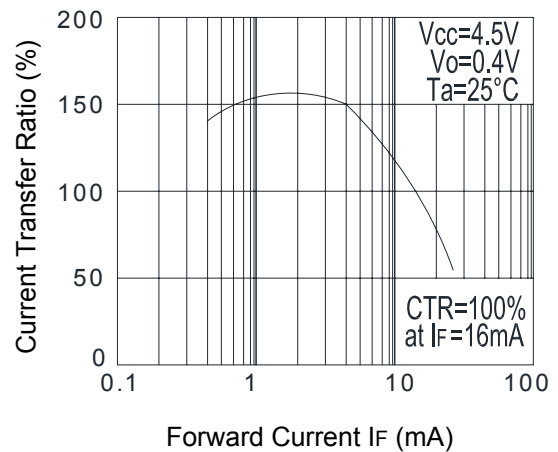
**Fig.2 Power Dissipation vs. Ambient Temperature**



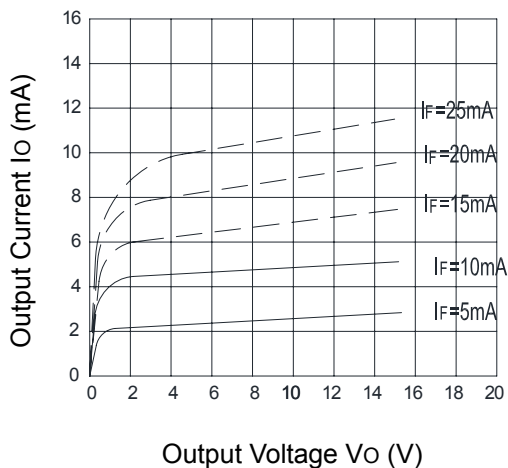
**Fig.3 Forward Current vs. Forward Voltage**



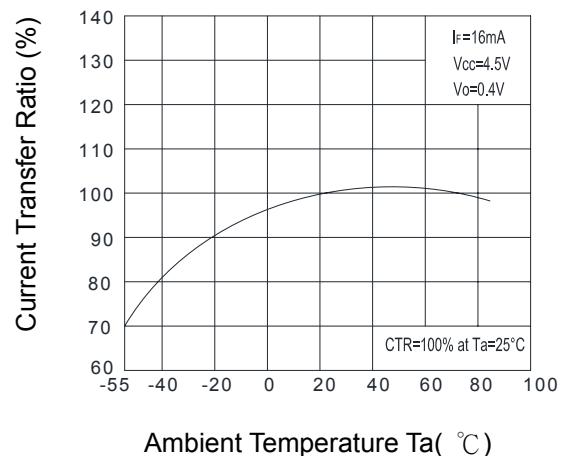
**Fig.4 Current Transfer Ratio vs. Forward Current**



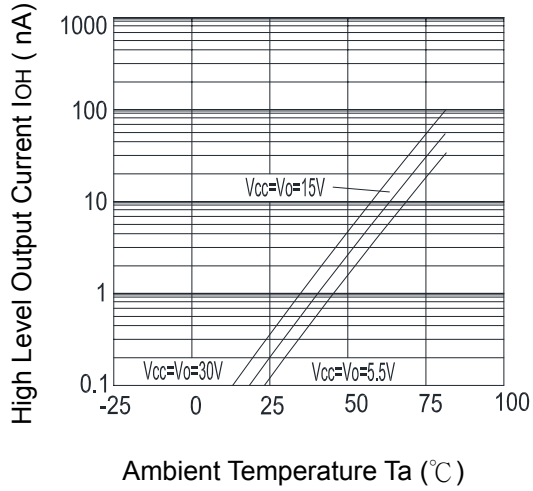
**Fig.5 Output Current vs. Output Voltage**



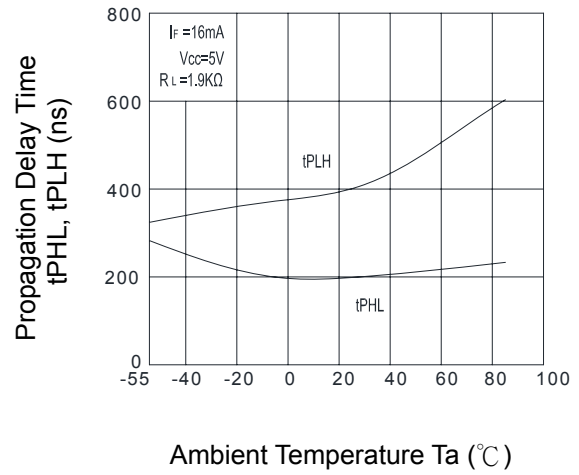
**Fig.6 Current Transfer Ratio vs. Ambient Temperature**



**Fig.7 Pulse Width Distortion vs. Ambient Temperature**



**Fig.8 Propagation Delay Time vs. Ambient Temperature**

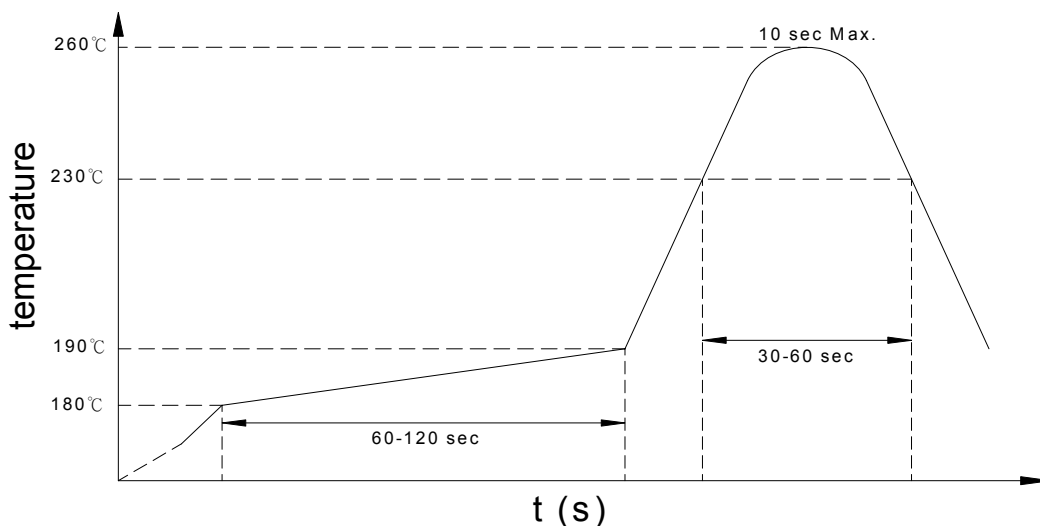


● **Recommended Soldering Conditions**

**(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**

**KPC457 (Z)**

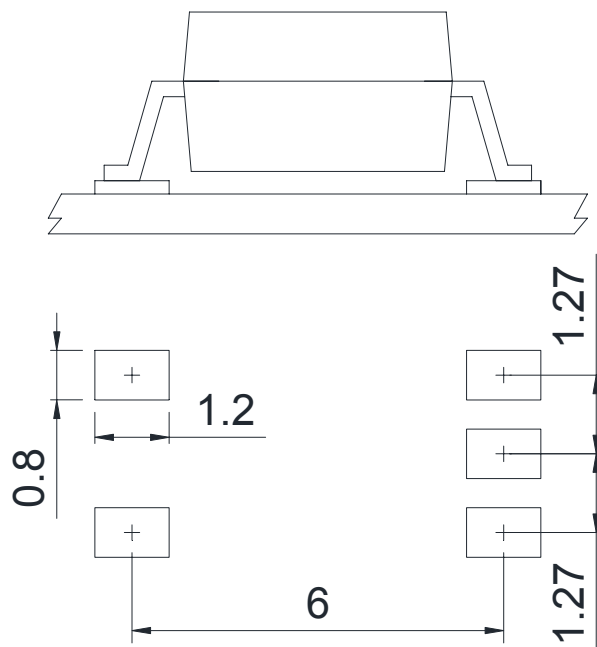
**Notes:**

KPC457 = 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 |

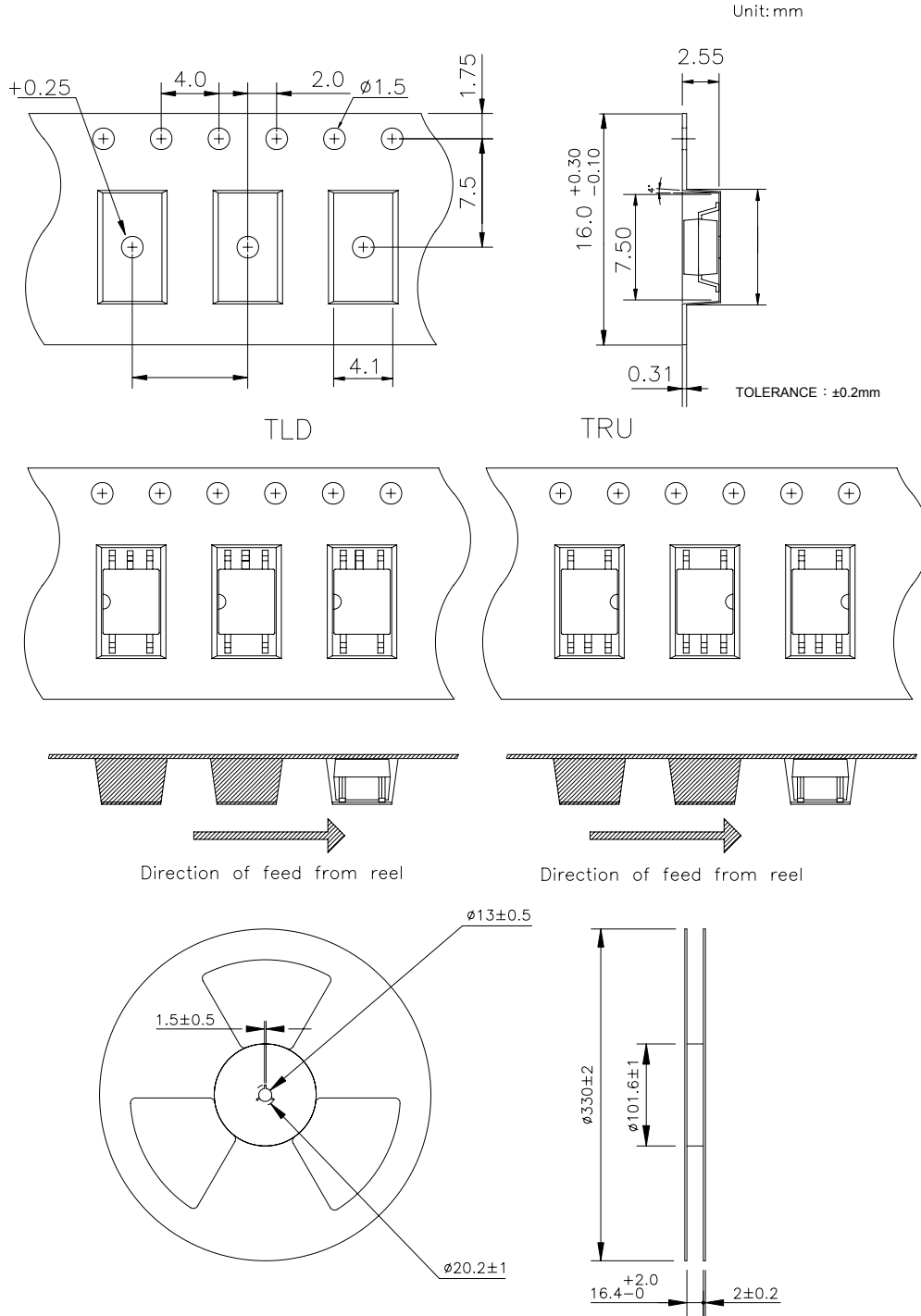
● **Recommended Pad Layout for Surface Mount Lead Form**



Unit : mm



● SOP Carrier Tape & Reel



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