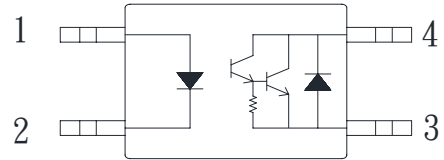


### ● Description

The KT1400 series consist of a photodarlington optically coupled to a gallium arsenide infrared-emitting diode in a 4 pin LSOP wide body package. Collector-emitter voltage is 300V. It features a high current transfer ratio, low coupling capacitance and high isolation voltage.

### ● Schematic



- 1. Anode
- 2. Cathode
- 3. Emitter
- 4. Collector

### ● Features

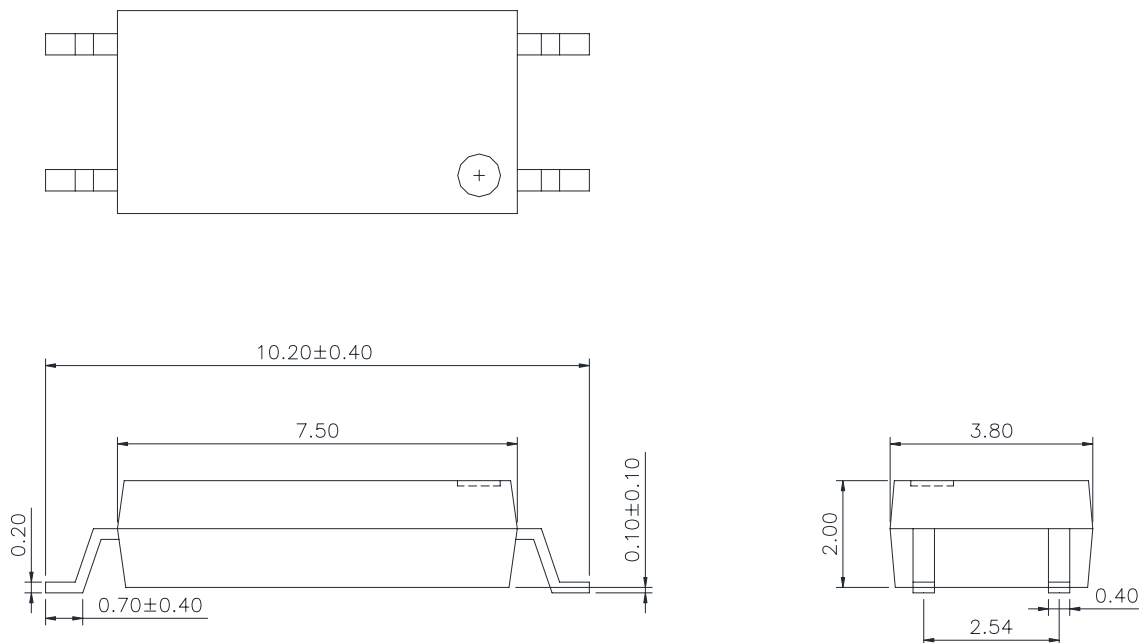
1. Halogen free
2. Pb free and RoHS compliant
3. Opaque type, SMD low profile 4 lead package
4. High collector-emitter voltage ( $V_{CE0} : 300V$ )
5. High current transfer ratio  
(CTR : Min.1000% at  $I_F = 1mA, V_{CE} = 2V$ )
6. High isolation voltage 5000Vrms
7. 8mm outer creepage distance
8. MSL class 1
9. Agency Approvals:
  - UL Approved (No. E169586): UL1577
  - c-UL Approved (No. E169586)
  - VDE Approved (No. 40031267): DIN EN60747-5-5
  - FIMKO Approved: EN60065, EN60950, EN60335, EN60601
  - CQC Approved: GB8898-2011, GB4943.1-2011

### ● Applications

- Telephone sets
- Copiers, facsimiles
- Interfaces with various power supply circuits, power distribution boards
- Hybrid substrates which require high density mounting

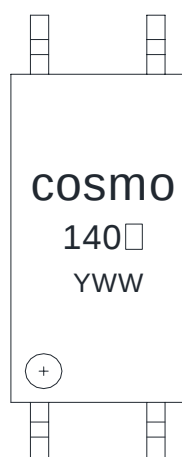
## ● Outside Dimension

Unit : mm



TOLERANCE :  $\pm 0.2\text{mm}$

## ● Device Marking



### Notes:

cosmo

140□

YWW

□: CTR rank

Y: Year code / WW: Week code

### ● Absolute Maximum Ratings

(Ta=25°C)

| Parameter                       |                             | Symbol           | Rating      | Unit             |
|---------------------------------|-----------------------------|------------------|-------------|------------------|
| Input                           | Forward current             | I <sub>F</sub>   | 50          | mA               |
|                                 | Peak forward current        | I <sub>FP</sub>  | 1           | A                |
|                                 | Reverse voltage             | V <sub>R</sub>   | 6           | V                |
|                                 | Power dissipation           | PD               | 70          | mW               |
| Output                          | Collector-Emitter voltage   | V <sub>CEO</sub> | 300         | V                |
|                                 | Emitter-Collector voltage   | V <sub>ECO</sub> | 0.1         | V                |
|                                 | Collector current           | I <sub>C</sub>   | 150         | mA               |
|                                 | Collector power dissipation | P <sub>C</sub>   | 150         | mW               |
| Total power dissipation         |                             | P <sub>tot</sub> | 170         | mW               |
| Isolation voltage 1 minute      |                             | V <sub>iso</sub> | 5000        | V <sub>rms</sub> |
| Operating temperature           |                             | T <sub>opr</sub> | -55 to +100 | °C               |
| Storage temperature             |                             | T <sub>stg</sub> | -55 to +125 | °C               |
| Soldering temperature 10 second |                             | T <sub>sol</sub> | 260         | °C               |

### ● Electro-optical Characteristics

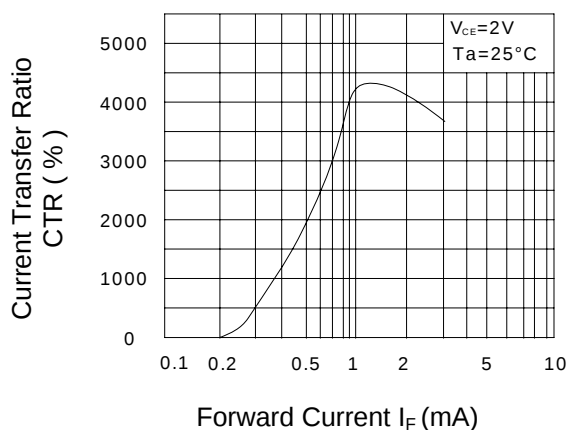
(Ta=25°C)

| Parameter                |                                      | Symbol               | Conditions                                                      | Min.               | Typ.             | Max. | Unit |
|--------------------------|--------------------------------------|----------------------|-----------------------------------------------------------------|--------------------|------------------|------|------|
| Input                    | Forward voltage                      | V <sub>F</sub>       | I <sub>F</sub> =20mA                                            | -                  | 1.2              | 1.4  | V    |
|                          | Reverse current                      | I <sub>R</sub>       | V <sub>R</sub> =4V                                              | -                  | -                | 10   | uA   |
|                          | Terminal capacitance                 | C <sub>t</sub>       | V=0, f=1KHz                                                     | -                  | 30               | -    | pF   |
| Output                   | Collector dark current               | I <sub>CEO</sub>     | V <sub>CE</sub> =200V, I <sub>F</sub> =0                        | -                  | -                | 1    | uA   |
|                          | Collector-Emitter breakdown voltage  | BV <sub>CEO</sub>    | I <sub>C</sub> =0.1mA, I <sub>F</sub> =0                        | 300                | -                | -    | V    |
| Transfer characteristics | Current transfer ratio               | CTR                  | I <sub>F</sub> =1mA, V <sub>CE</sub> =2V                        | 1000               | -                | -    | %    |
|                          | Collector-Emitter saturation voltage | V <sub>CE(sat)</sub> | I <sub>F</sub> =1mA, I <sub>C</sub> =2mA                        | -                  | -                | 1.5  | V    |
|                          | Isolation resistance                 | R <sub>iso</sub>     | DC500V, 40 to 60%RH                                             | 5x10 <sup>10</sup> | 10 <sup>11</sup> | -    | Ω    |
|                          | Floating capacitance                 | C <sub>f</sub>       | V=0, f=1MHz                                                     | -                  | 0.6              | 1.0  | pF   |
|                          | Response time (Rise)                 | t <sub>r</sub>       | V <sub>CC</sub> =2V, I <sub>C</sub> =20mA, R <sub>L</sub> =100Ω | -                  | 100              | 300  | us   |
|                          | Response time (Fall)                 | t <sub>f</sub>       |                                                                 | -                  | 20               | 100  | us   |

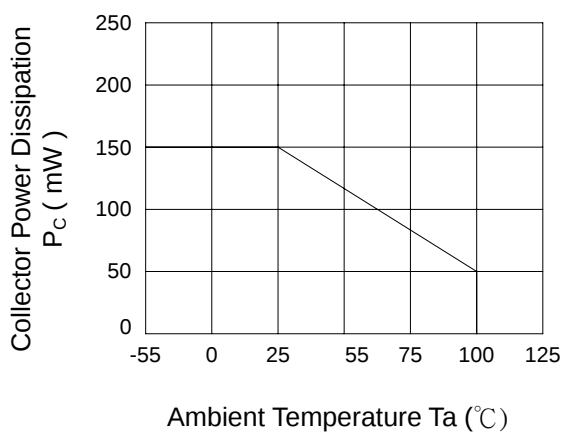
Classification table of current transfer ratio is shown below.

| CTR Rank | CTR ( % ) |
|----------|-----------|
| KT1400   | Min.1000  |

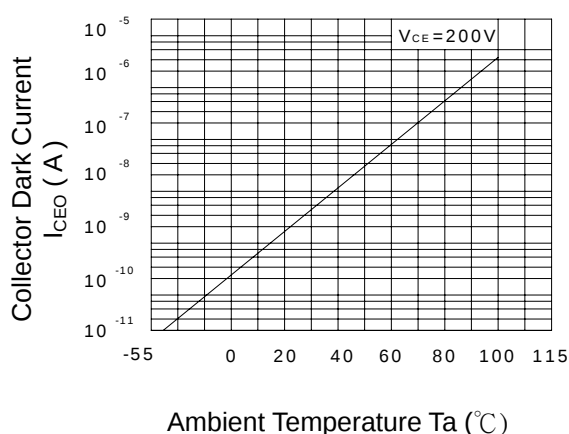
**Fig.1 Current Transfer Ratio  
vs. Forward Current**



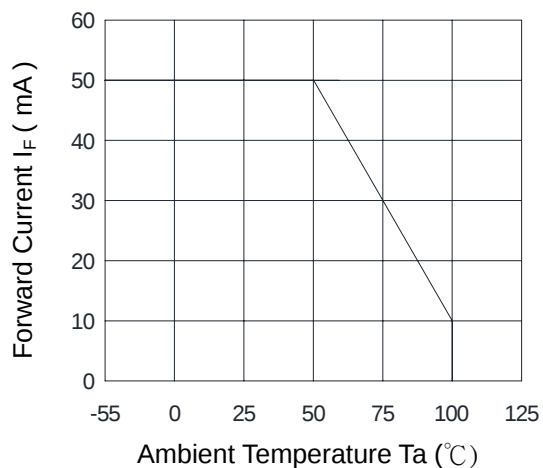
**Fig.2 Collector Power Dissipation  
vs. Ambient Temperature**



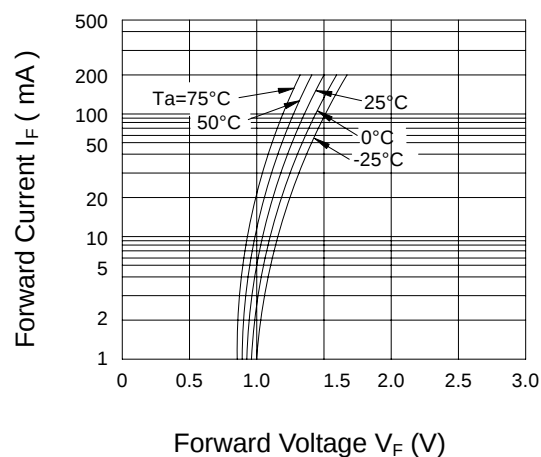
**Fig.3 Collector Dark Current  
vs. Ambient Temperature**



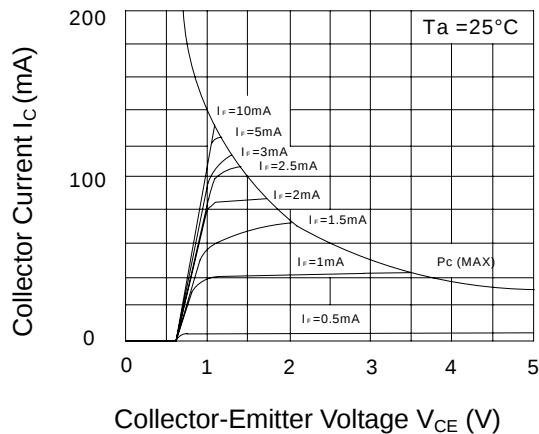
**Fig.4 Forward Current  
vs. Ambient Temperature**



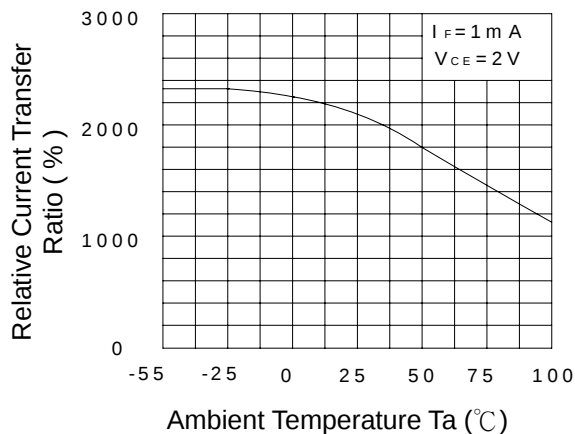
**Fig.5 Forward Current  
vs. Forward Voltage**



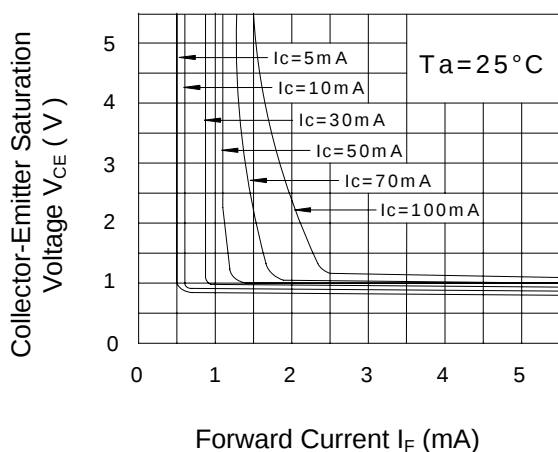
**Fig.6 Collector Current  
vs. Collector-Emitter Voltage**



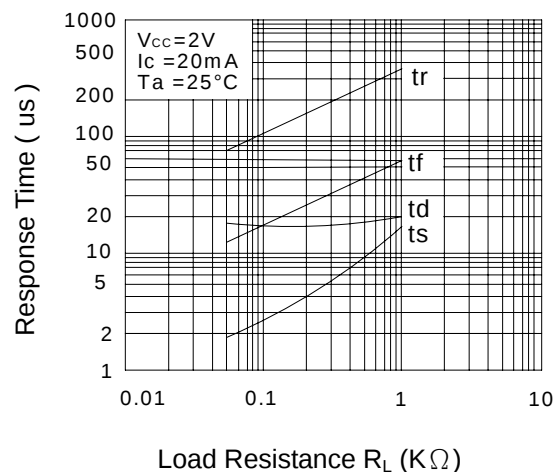
**Fig.7 Relative Current Transfer Ratio  
vs. Ambient Temperature**



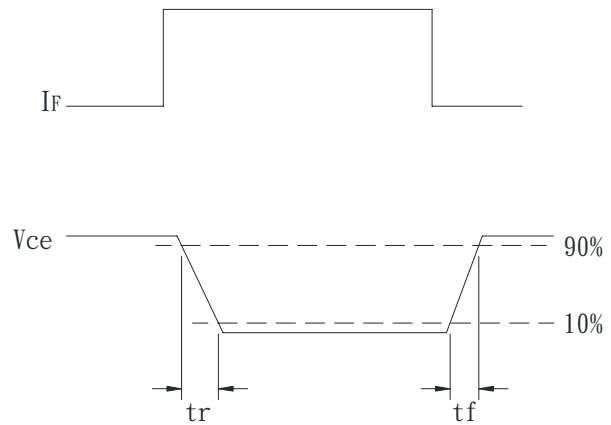
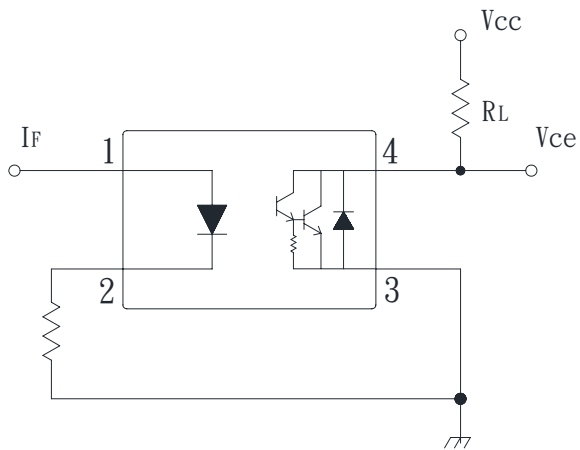
**Fig.8 Collector-Emitter Saturation  
Voltage vs. Forward Current**



**Fig.9 Response Time  
vs. Load Resistance**



● **Test Circuit for Response Time**

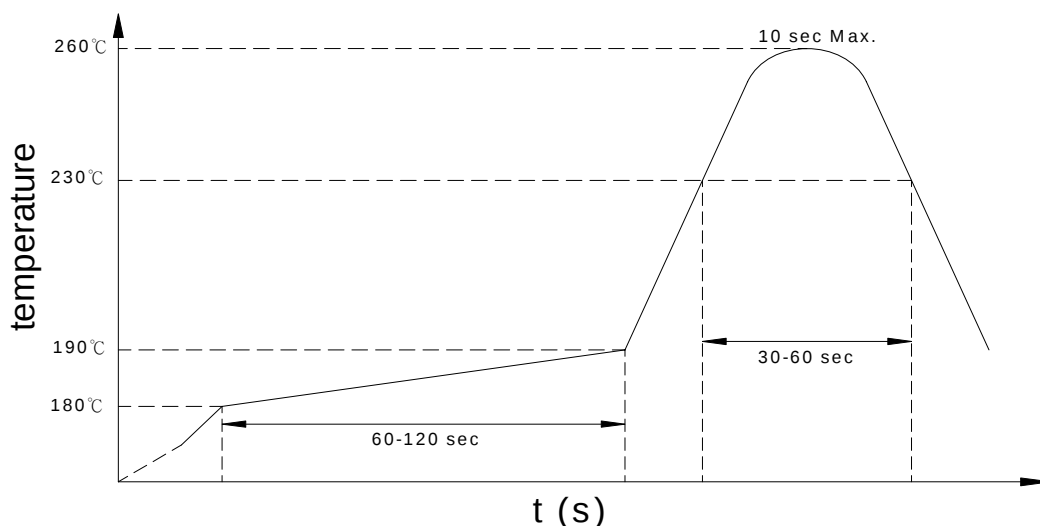


### ● Recommended Soldering Conditions

#### (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**

## KT1400 (Z)

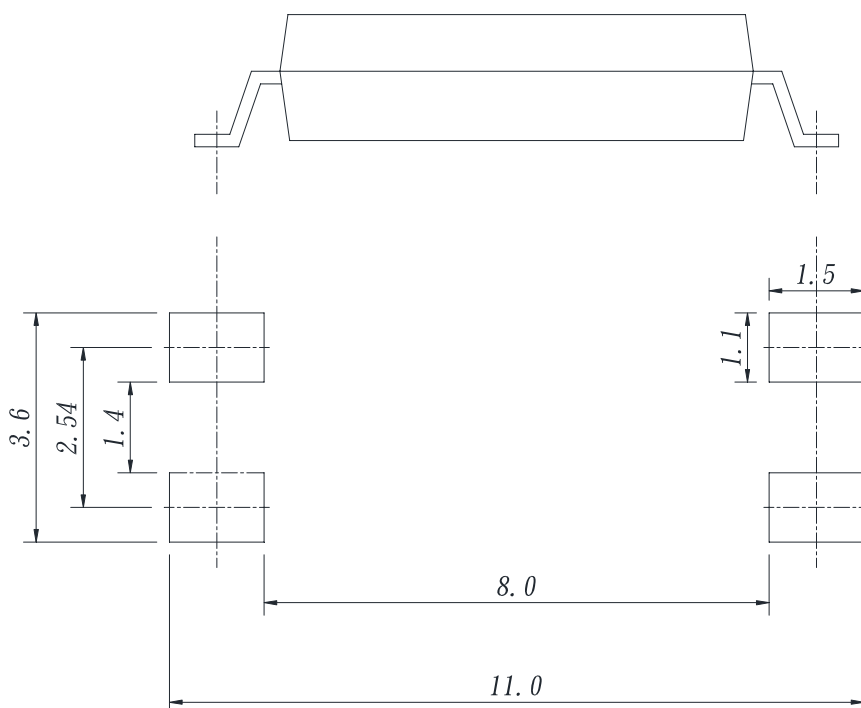
**Notes:**

KT1400= Part No.

Z = Tape and reel option (TLD 、 TRU)

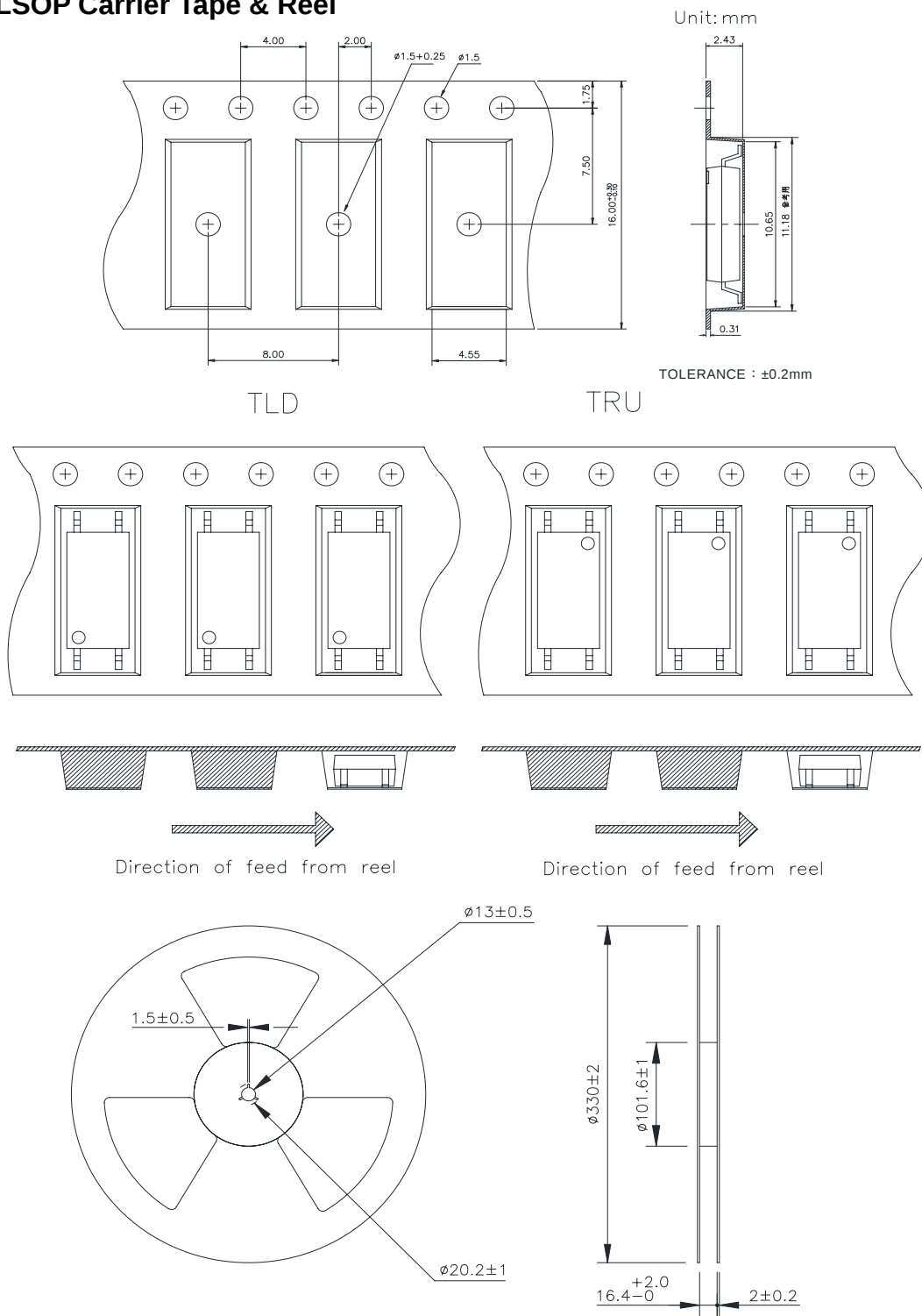
| Option | Description            | Packing quantity    |
|--------|------------------------|---------------------|
| (TLD)  | TLD tape & reel option | 3000 units per reel |
| (TRU)  | TRU tape & reel option | 3000 units per reel |

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



Unit : mm

### ● 4-pin LSOP Carrier Tape & Reel



## ● Application Notice

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