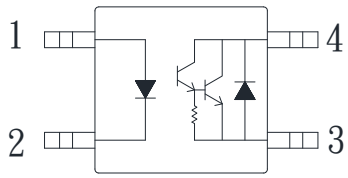
# KPC452 Series

## 4PIN MINI-FLAT PHOTODARLINGTON PHOTOCOUPLER

## Description

The KPC452 consist of a photo darlington optically coupled to a gallium arsenide infrared-emitting diodes in a 4-pin Mini-Flat package. Collector-emitter voltage is 300V. The input-output isolation voltage is rated at 3750 Vrms..

## Schematic




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

## Features

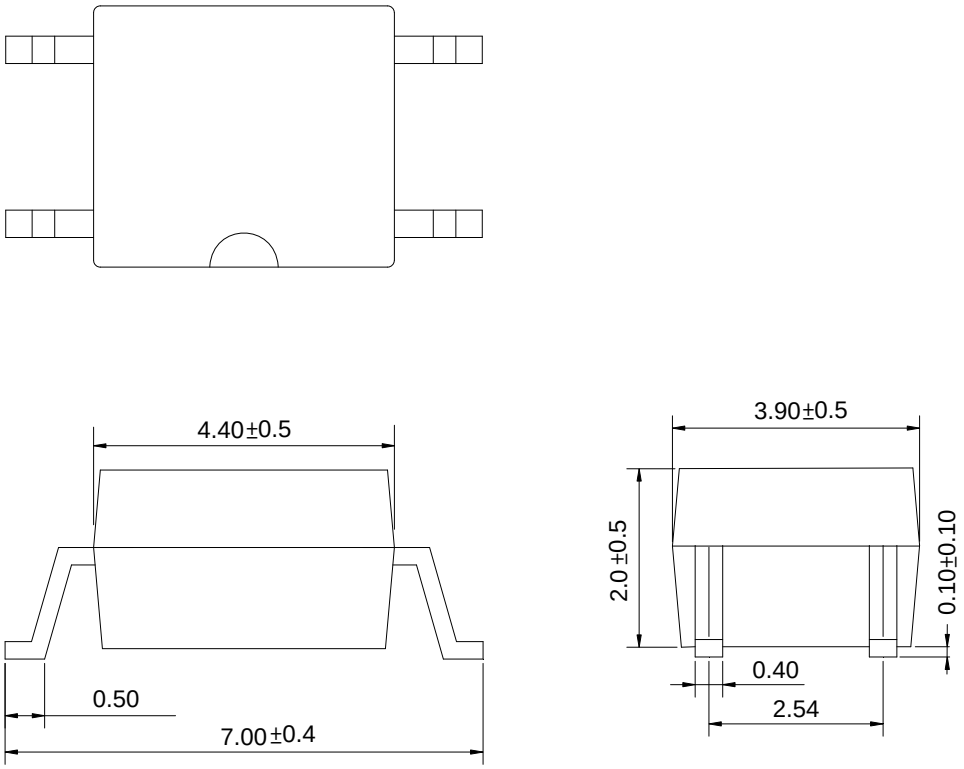
1. Pb free and RoHS compliant
2. Mini-flat package: compact 4 pin SOP with a 2.0mm profile
3. High collector-emitter voltage ($V_{CEO}$ : 300V)
4. High current transfer ratio
   (CTR : MIN.1000% at $I_F$ =1mA,$V_{CE}$ =2V)
5. High isolation voltage between input and output (Viso:3750Vrms)
6. MSL class 1
7. Agency Approvals:
   - UL Approved (No. E169586): UL1577
   - c-UL Approved (No. E169586)
   - VDE Approved (No. 40014684): DIN EN 60747-5-5
   - FIMKO Approved: EN62368-1, EN60601-1
   - 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

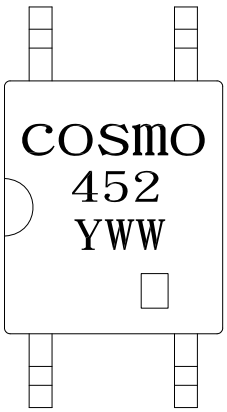
## Outside Dimension

Unit : mm




TOLERANCE : ±0.2mm

## Device Marking




**Notes:**

Cosmo
452
YWW  Y: Year code / WW: Week code
□  □:CTR rank

## Absolute Maximum Ratings

(Ta=25℃)

| Parameter | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Input | Forward current | $I_F$ | 50 | mA |
| | Peak forward current | $I_{FM}$ | 1 | A |
| | Reverse voltage | $V_R$ | 6 | V |
| | Power dissipation | $P_D$ | 70 | mW |
| Output | Collector-Emitter voltage | $V_{CEO}$ | 300 | V |
| | Emitter-Collector voltage | $V_{ECO}$ | 0.1 | V |
| | Collector current | $I_C$ | 150 | mA |
| | Collector power dissipation | $P_C$ | 150 | mW |
| Total power dissipation | | Ptot | 170 | mW |
| Isolation voltage 1 minute | | Viso | 3750 | Vrms |
| Operating temperature | | Topr | -55 to +115 | ℃ |
| Storage temperature | | Tstg | -55 to +125 | ℃ |
| Soldering temperature 10 seconds | | Tsol | 260 | ℃ |

## Electro-optical Characteristics

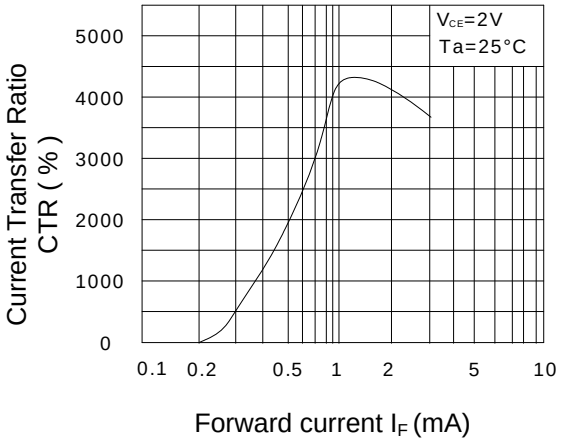
(Ta=25℃)

| Parameter | | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Input | Forward voltage | $V_F$ | $I_F$=20mA | - | 1.2 | 1.4 | V |
| | Reverse current | $I_R$ | $V_R$=4V | - | - | 10 | uA |
| | Terminal capacitance | Ct | V=0, f=1KHz | - | 30 | - | pF |
| Output | Collector dark current | $I_{CEO}$ | $V_{CE}$=200V, $I_F$=0 | - | - | 1 | uA |
| | Collector-Emitter breakdown voltage | $BV_{CEO}$ | Ic=0.1mA, $I_F$=0 | 300 | - | - | V |
| Transfer charac-teristics | Current transfer ratio | CTR | $I_F$=1mA, $V_{CE}$=2V | 1000 | - | - | % |
| | Collector-Emitter saturation voltage | $V_{CE}$(sat) | $I_F$=20mA, Ic=100mA | - | - | 1.5 | V |
| | Isolation resistance | Riso | DC500V, 40 to 60%RH | $5x10^{10}$ | $10^{11}$ | - | Ω |
| | Floating capacitance | Cf | V=0, f=1MHz | - | 0.6 | 1.0 | pF |
| | Response time (Rise) | tr | Vce=2V,Ic=20mA,$R_L$=100Ω | - | 100 | 300 | us |
| | Response time (Fall) | tf | | - | 20 | 100 | us |

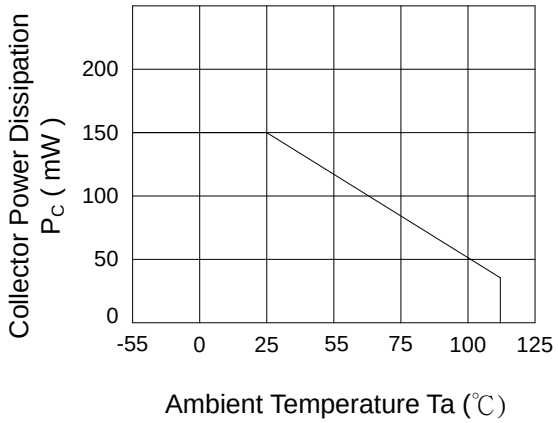
**Classification table of current transfer ratio is shown below.**

| CTR RANK | CTR ( % ) |
|---|---|
| KPC4520E | Min.1000 |

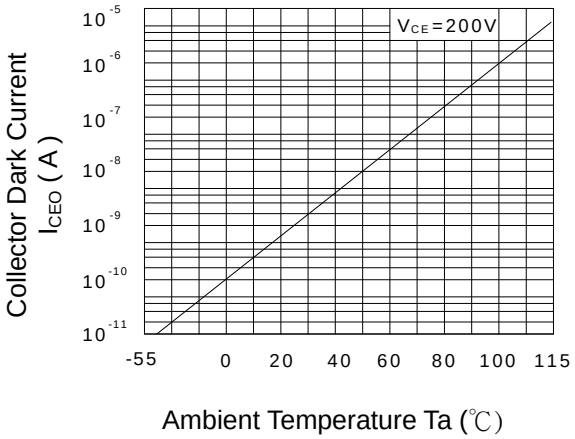
### Fig.1 Current Transfer Ratio vs. Forward Current



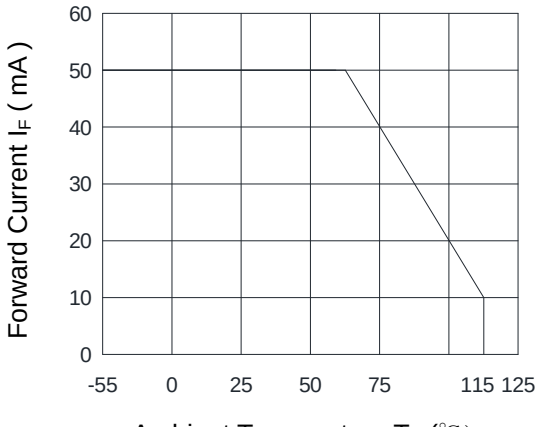

### Fig.2 Collector Power Dissipation vs. Ambient Temperature



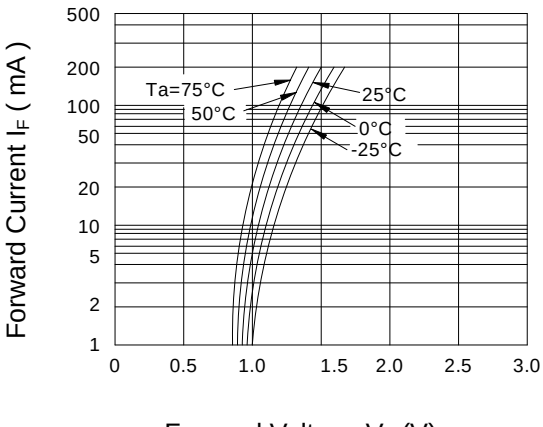

### Fig.3 Collector Dark Current vs. Ambient Temperature



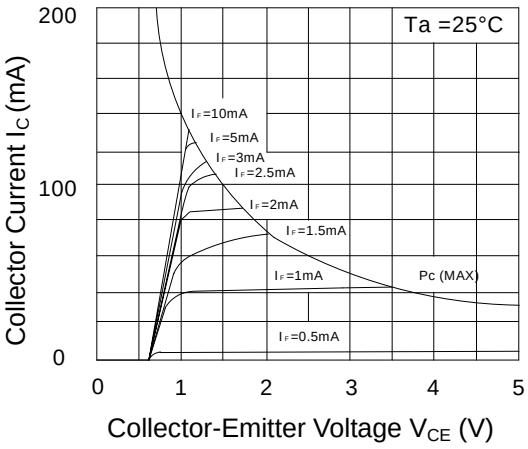

### Fig.4 Forward Current vs. Ambient Temperature



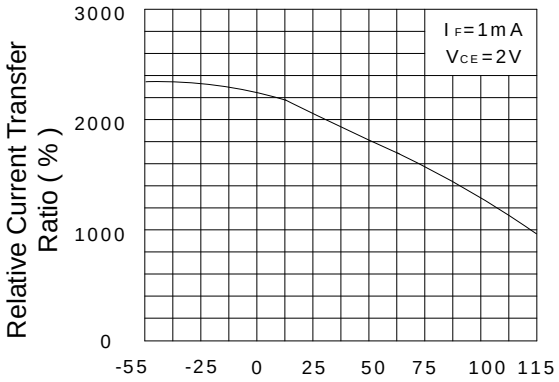

### Fig.5 Forward Current vs. Forward Voltage



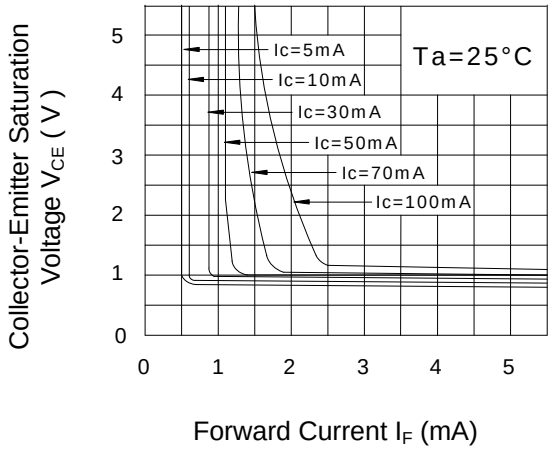
## Fig.6 Collector Current vs. Collector-Emitter Voltage



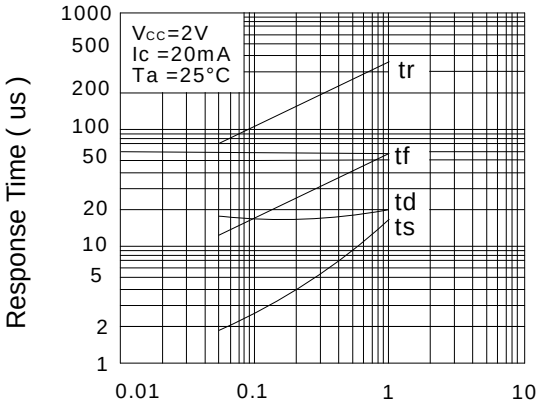

## Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature



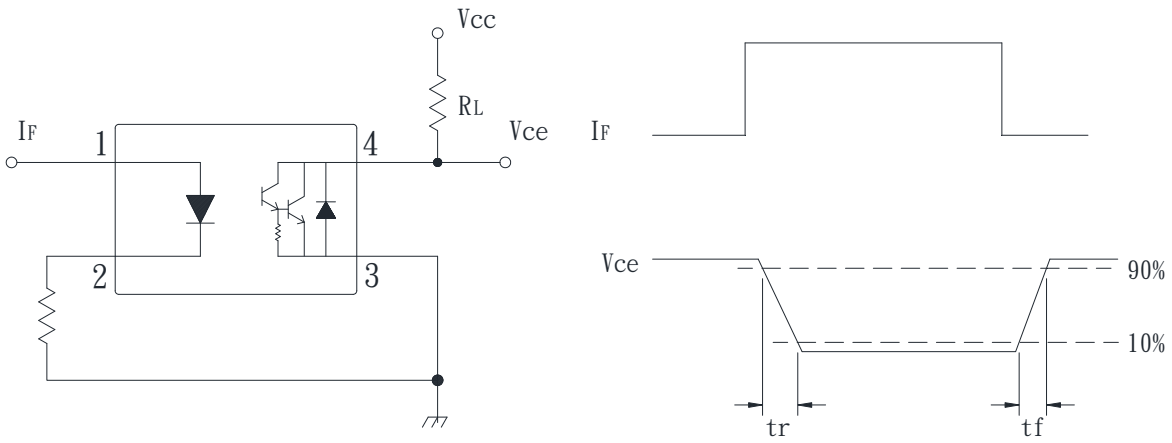

## Fig.8 Collector-Emitter Saturation Voltage vs. Forward Current




## Fig.9 Response Time vs. Load Resistance



- **Test Circuit for Response Time**

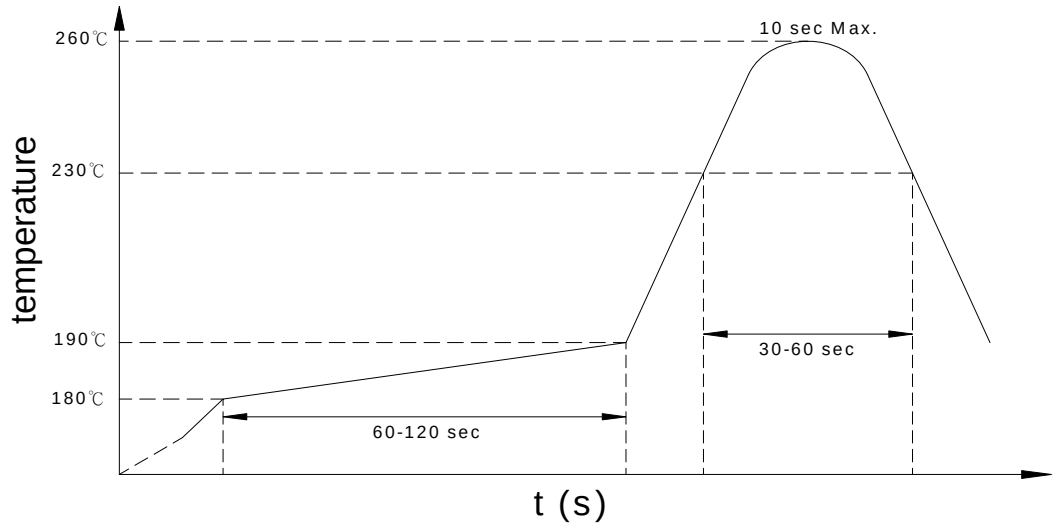


## Recommended Soldering Conditions

**(a) Infrared reflow soldering：**

- Peak reflow soldering： 260℃ or below (package surface temperature)
- Time of peak reflow temperature： 10 sec
- Time of temperature higher than 230℃： 30-60 sec
- Time to preheat temperature from 180~190℃： 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℃ or below (molten solder temperature)
- Time： 10 seconds or less
- Preheating conditions： 120℃ 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**

**KPC452 Y (Z)**

**Notes:**

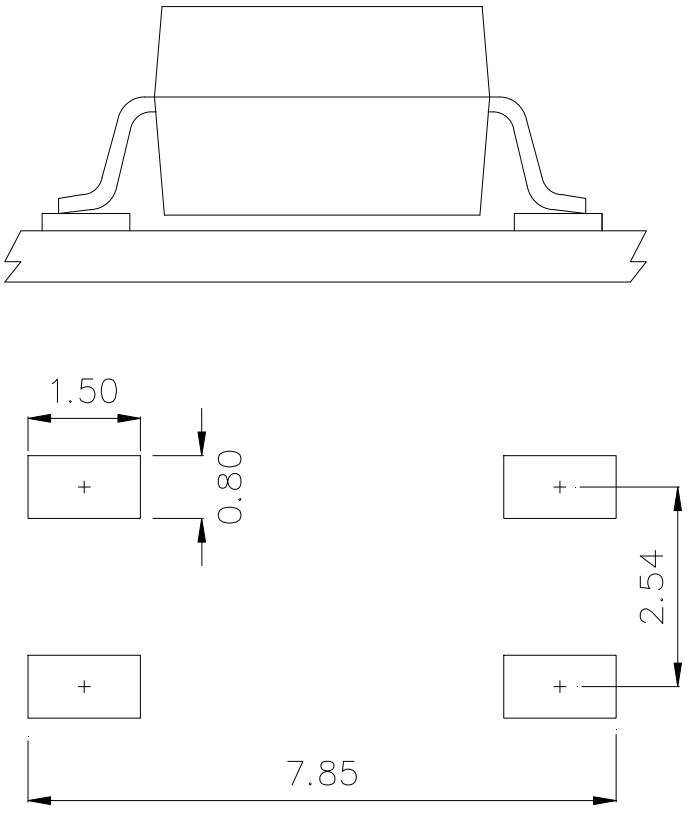
KPC452 = Part No.

Y = CTR rank (E)

Z = Tape and reel option (TLD、TRU)

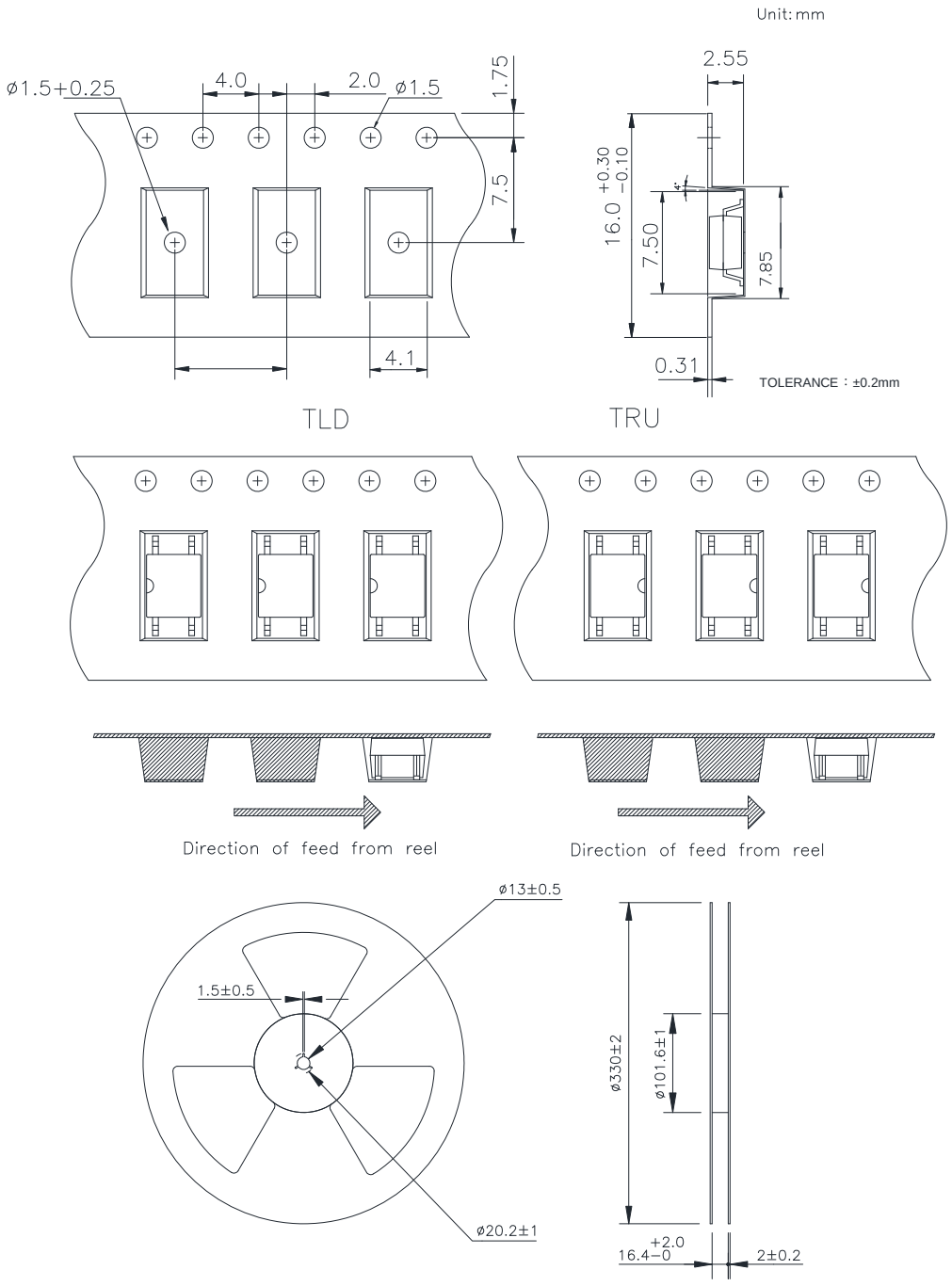
| Option | Description | Packing quantity |
|---|---|---|
| TLD | TLD tape & reel option | 3000 units per reel |
| TRU | TRU tape & reel option | 3000 units per reel |

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




Unit : mm

## 4-pin Mini-Flat Carrier Tape & Reel



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