# TD357 Series

## SOP4, DC Input Photo Transistor Coupler

## Description

The TD357 series combine an AlGaAs infrared emitting diode as the emitter which is optically coupled to a silicon planar phototransistor detector in a plastic SOP4 package.
With the robust coplanar double mold structure, TD357 series provide the most stable isolation feature.

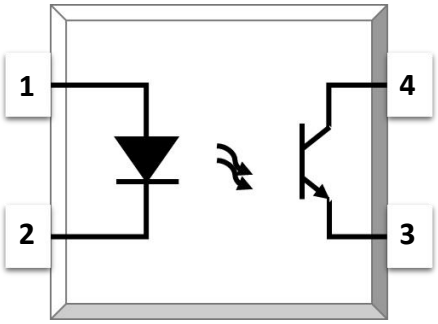
## Features

- High isolation 3750 VRMS
- CTR flexibility available see order information
- DC input with transistor output
- Operating temperature range - 55 °C to 110 °C
- REACH compliance
- Halogen free
- MSL class 1
- Regulatory Approvals
  - UL - UL1577
  - VDE - EN60747-5-5(VDE0884-5)
  - CQC - GB4943.1, GB8898
  - cUL- CSA Component Acceptance Service Notice No. 5A

## Applications

- Switch mode power supplies
- Programmable controllers
- Household appliances
- Office equipment

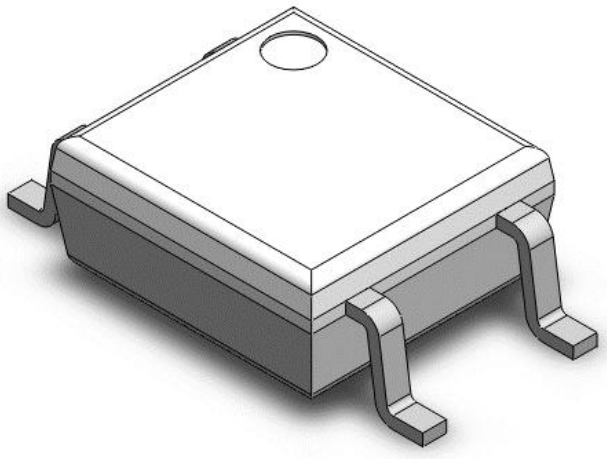
## SCHEMATIC




## PIN DEFINITION

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

## PACKAGE OUTLINE



| ABSOLUTE MAXIMUM RATINGS | | | | |
|---|---|---|---|---|
| PARAMETER | SYMBOL | VALUE | UNIT | NOTE |
| INPUT | | | | |
| Forward Current | $I_F$ | 60 | mA | |
| Peak Forward Current | $I_{FP}$ | 1 | A | 1 |
| Reverse Voltage | $V_R$ | 6 | V | |
| Input Power Dissipation | $P_I$ | 100 | mW | |
| OUTPUT | | | | |
| Collector - Emitter Voltage | $V_{CEO}$ | 35 | V | |
| Emitter - Collector Voltage | $V_{ECO}$ | 6 | V | |
| Collector Current | $I_C$ | 50 | mA | |
| Output Power Dissipation | $P_O$ | 150 | mW | |
| COMMON | | | | |
| Total Power Dissipation | Ptot | 200 | mW | |
| Isolation Voltage | Viso | 3750 | Vrms | 2 |
| Operating Temperature | Topr | -55~110 | °C | |
| Storage Temperature | Tstg | -55~125 | °C | |
| Soldering Temperature | Tsol | 260 | °C | |

Note 1. 100μs pulse, 100Hz frequency

Note 2. AC For 1 Minute, R.H. = 40 ~ 60%

| ELECTRICAL OPTICAL CHARACTERISTICS at Ta=25°C | | | | | | | |
|---|---|---|---|---|---|---|---|
| PARAMETER | SYMBOL | MIN | TYP. | MAX. | UNIT | TEST CONDITION | NOTE |
| INPUT | | | | | | | |
| Forward Voltage | $V_F$ | - | 1.24 | 1.4 | V | IF=10mA | |
| Reverse Current | $I_R$ | - | - | 10 | μA | VR=6V | |
| Input Capacitance | Cin | - | 10 | - | pF | V=0, f=1kHz | |
| OUTPUT | | | | | | | |
| Collector Dark Current | $I_{CEO}$ | - | - | 100 | nA | VCE=20V, IF=0 | |
| Collector-Emitter Breakdown Voltage | $BV_{CEO}$ | 35 | - | - | V | IC=0.1mA, IF=0 | |
| Emitter-Collector Breakdown Voltage | $BV_{ECO}$ | 6 | - | - | V | IE=0.1mA, IF=0 | |
| TRANSFER CHARACTERISTICS | | | | | | | |
| Current Transfer Ratio | TD357 | CTR | 50 | - | 600 | % | IF=5mA, VCE=5V | |
| | TD357A | | 80 | - | 160 | | | |
| | TD357B | | 130 | - | 260 | | | |
| | TD357C | | 200 | - | 400 | | | |
| | TD357D | | 300 | - | 600 | | | |
| | TD357E | | 100 | - | 200 | | | |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | - | 0.06 | 0.2 | V | IF=20mA, IC=1mA | |
| Isolation Resistance | $R_{ISO}$ | 10^12 | 10^14 | - | Ω | DC500V, 40 ~ 60% R.H. | |
| Floating Capacitance | $C_{IO}$ | - | 0.4 | 1 | pF | V=0, f=1MHz | |
| Response Time (Rise) | tr | - | 3 | 18 | μs | VCE=2V, IC=2mA RL=100Ω | 3 |
| Response Time (Fall) | tf | - | 4 | 18 | μs | | 3 |
| Cut-off Frequency | fc | - | 80 | - | kHz | VCE=2V, IC=2mA RL=100Ω,-3dB | 4 |

Note 3. Fig.12&13

Note 4. Fig.14

## CHARACTERISTIC CURVES

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

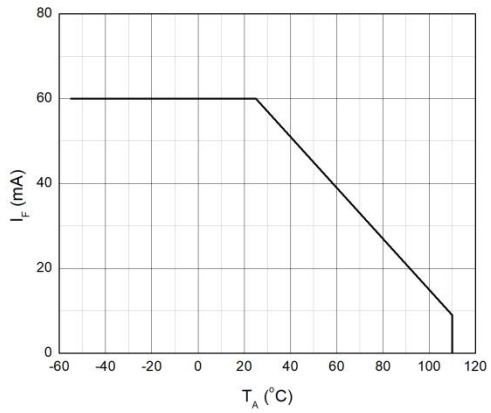



**Fig.2 Collector Power Dissipation vs. Ambient Temperature**

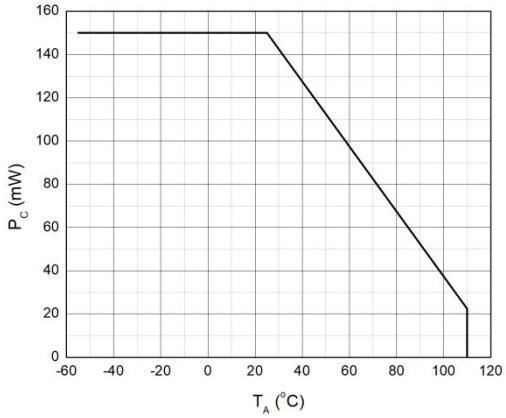



**Fig.3 Forward Current vs. Forward Voltage**

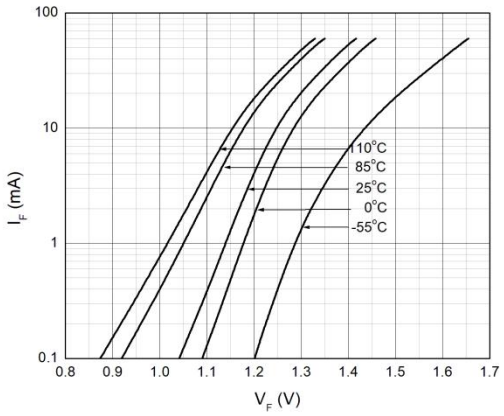



**Fig.4 Collector Dark Current vs. Ambient Temperature**

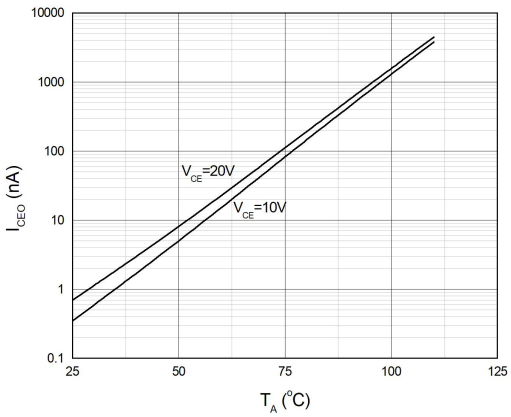



**Fig.5 Collector Current vs. Collector-emitter Voltage**

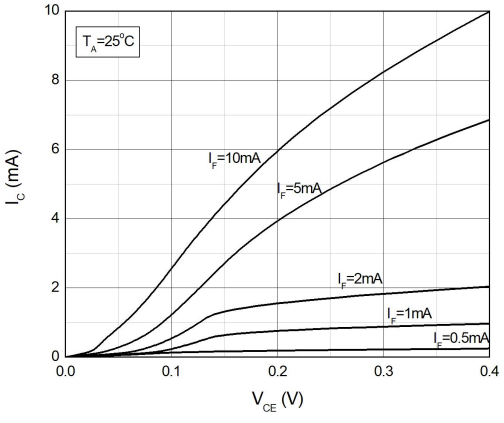
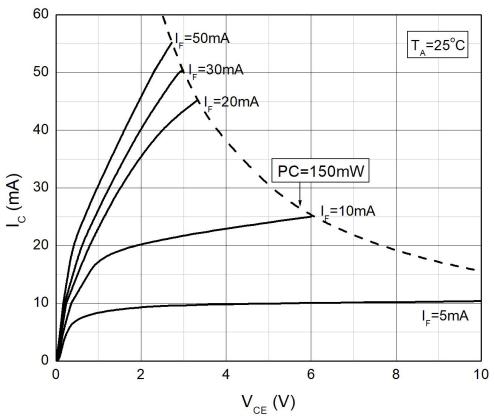



**Fig.6 Collector Current vs. Collector-emitter Voltage**



## CHARACTERISTIC CURVES

**Fig.7 Normalized Current Transfer Ratio vs. Forward Current**

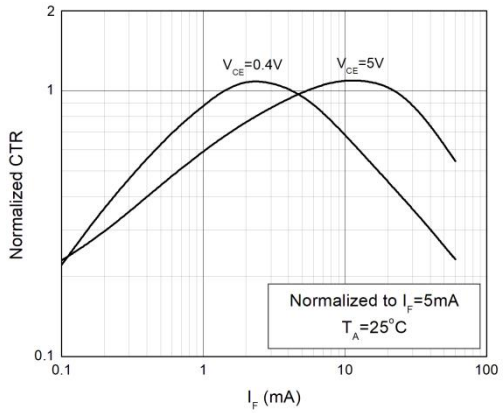



**Fig.8 Normalized Current Transfer Ratio vs. Ambient Temperature**

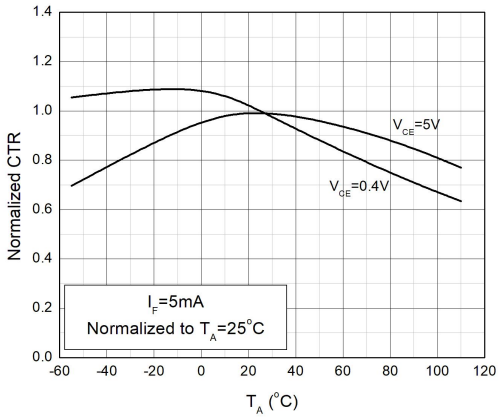



**Fig.9 Collector-emitter Saturation Voltage vs. Ambient Temperature**

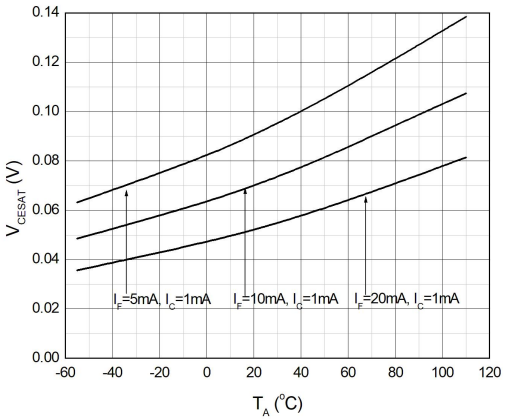



**Fig.10 Switching Time vs. Load Resistance**

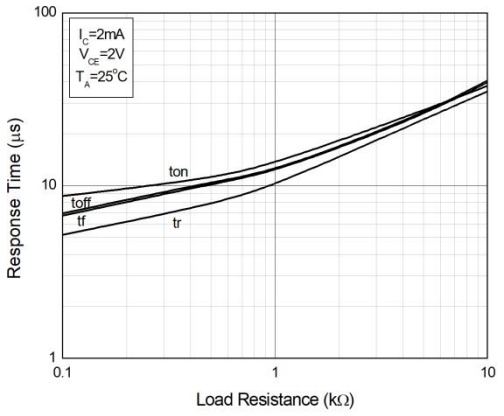
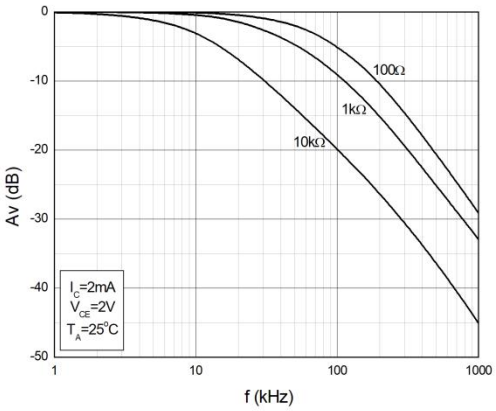



**Fig.11 Frequency Response**



## TEST CIRCUITS

**Fig.12 Test Circuits of Response Time**

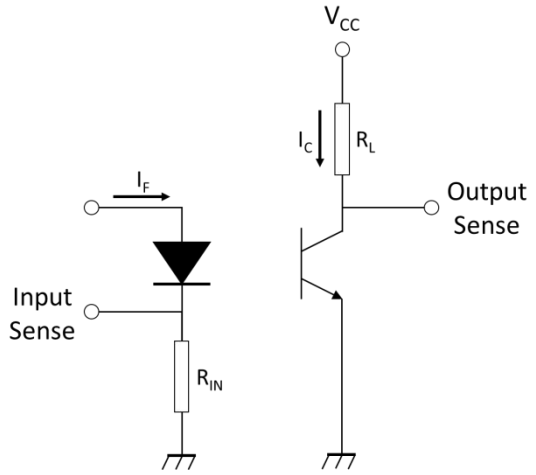



**Fig.13 Curves of Response Time**

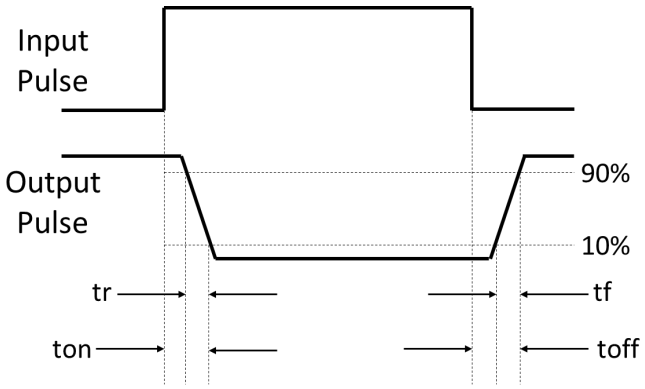
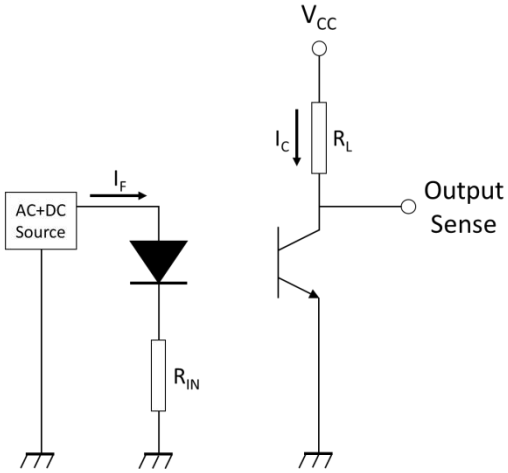
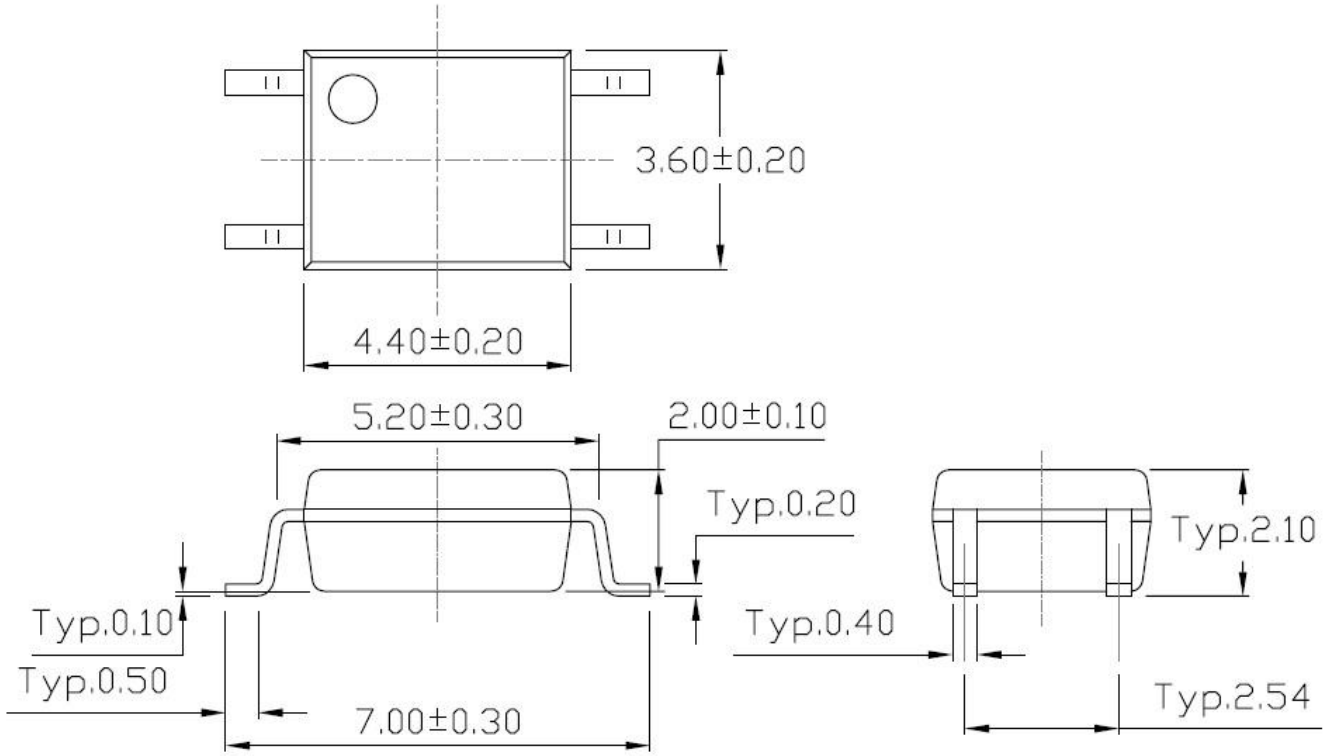


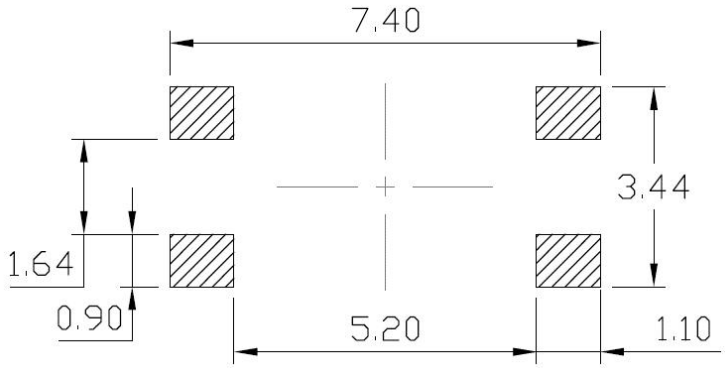

**Fig.14 Test Circuits of Frequency Response**



## PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)

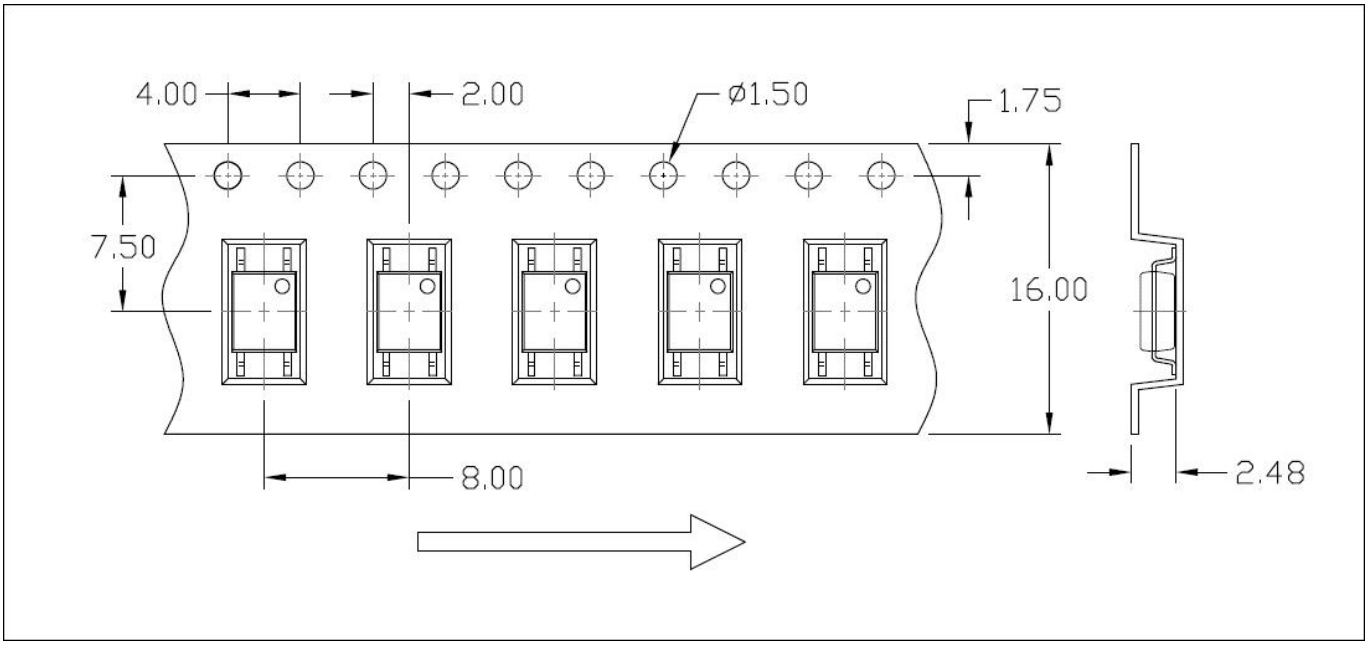



## Recommended Solder Mask (Dimensions in mm unless otherwise stated)

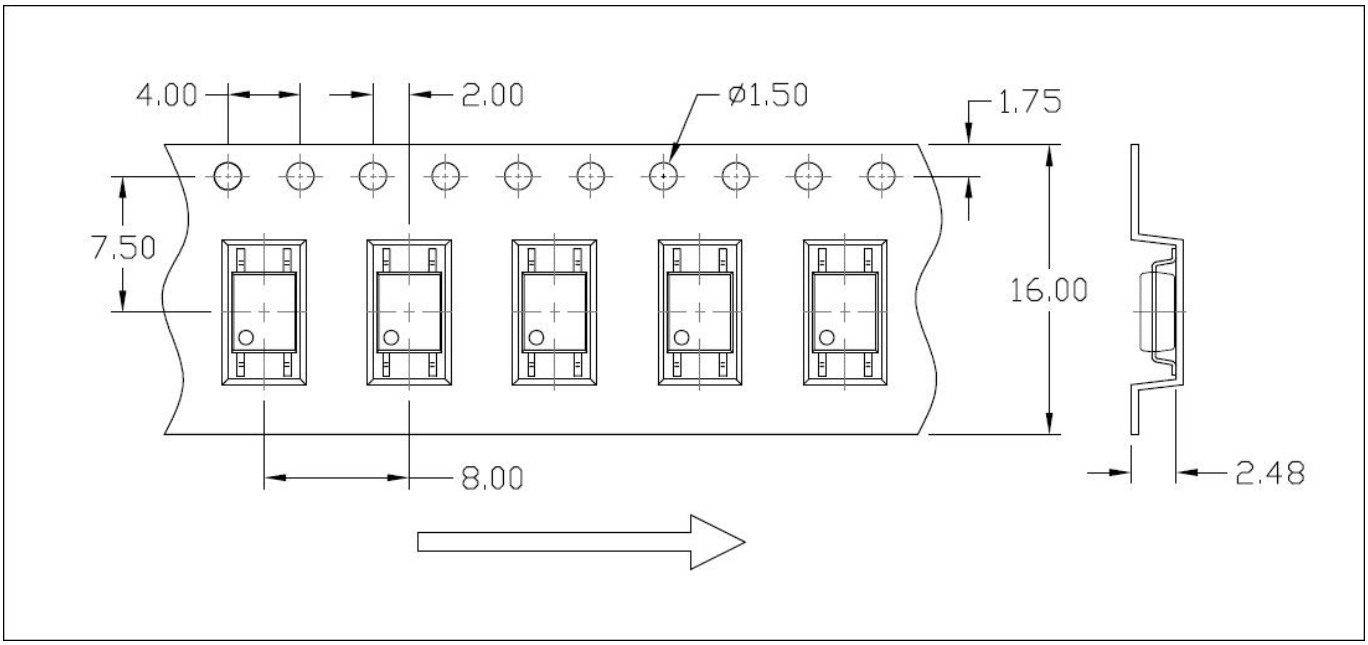


## CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

### Option T1

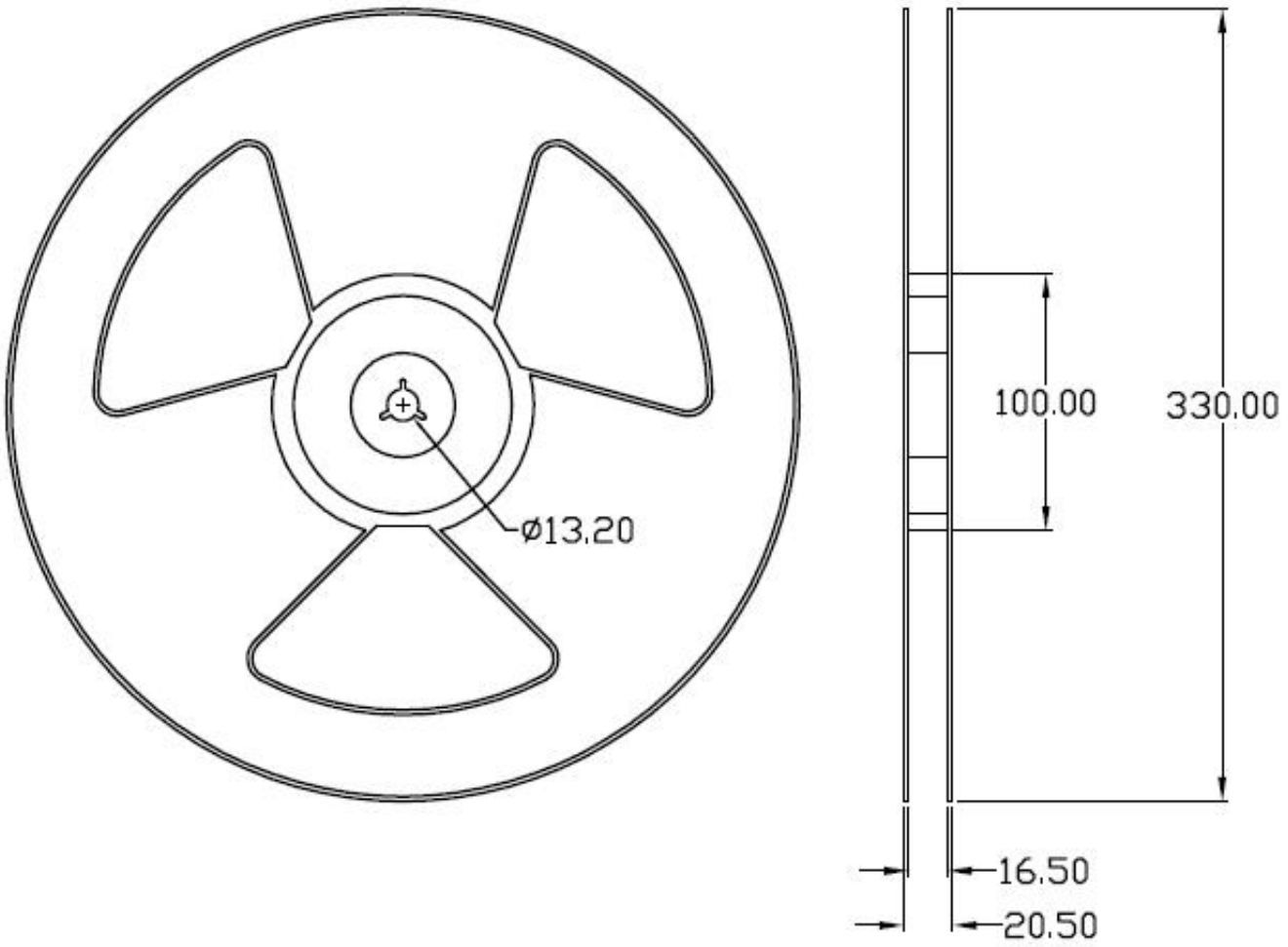



### Option T2



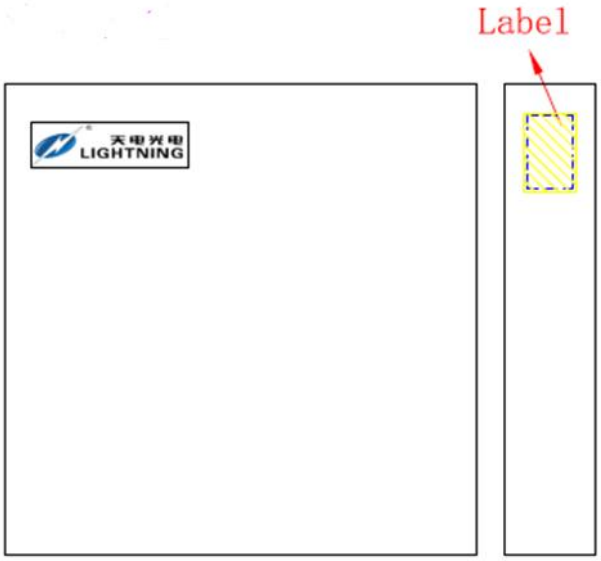
## REEL SPECIFICATIONS (Dimensions in mm unless otherwise stated)

**Option T1 & T2**



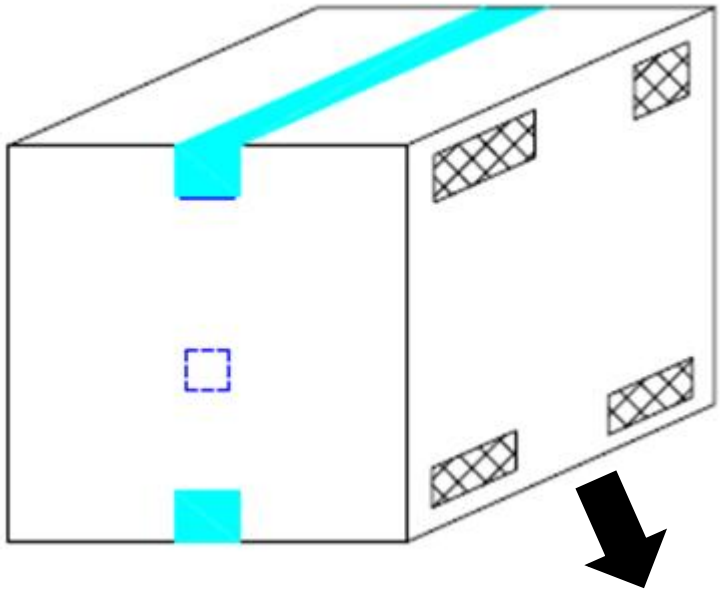
## BOX SPECIFICATIONS (Reel Type)

### Inner Box

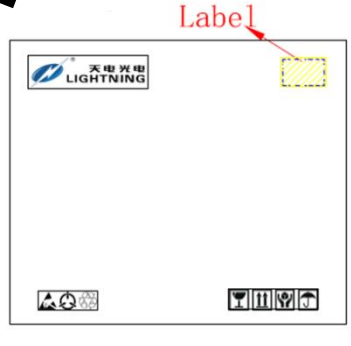



- L x W x H = 36cm x 36cm x 6.9cm

### Outer Box

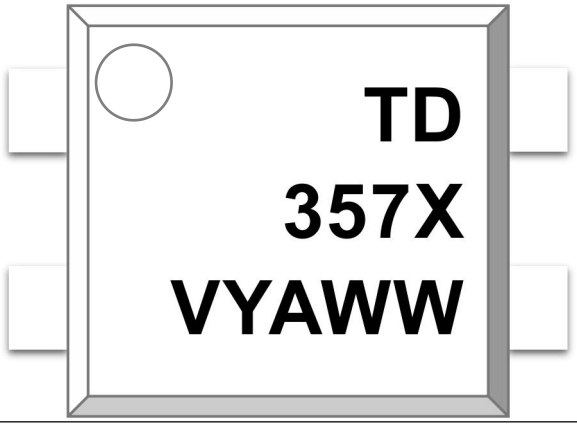


- L x W x H = 45cm x 38cm x 38cm



## ORDERING AND MARKING INFORMATION

### MARKING INFORMATION




**TD** : Company Abbr.
**357** : Part Number
**X** : CTR Rank
**V** : VDE Option
**Y** : Fiscal Year
**A** : Manufacturing Code
**WW** : Work Week

### ORDERING INFORMATION

**TD357X(Z)-GV**

TD – Company Abbr.
357 – Part Number
X – Rank (A/B/C/D/E or None)
Z – Tape and Reel Option (T1/T2)
G – Green
V – VDE Option (V or None)

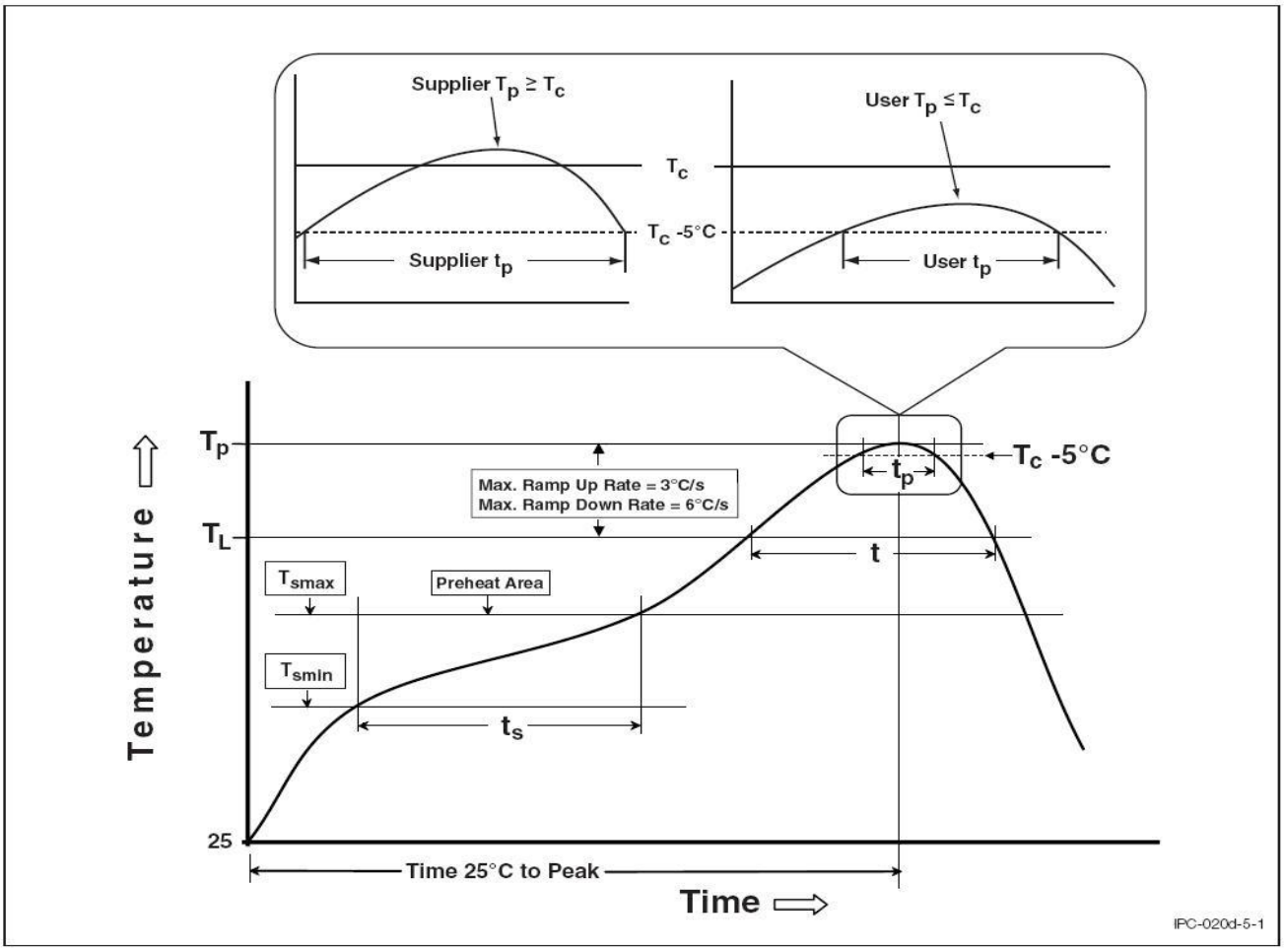
### LABEL INFORMATION


### PACKING QUANTITY

| Option | Quantity | Quantity – Inner box | Quantity – Outer box |
|---|---|---|---|
| T1 | 3000 Units/Reel | 3 Reels/Inner box | 5 Inner box/Outer box = 45k Units |
| T2 | 3000 Units/Reel | 3 Reels/Inner box | 5 Inner box/Outer box = 45k Units |

## REFLOW INFORMATION

### REFLOW PROFILE




| Profile Feature | Sn-Pb Assembly Profile | Pb-Free Assembly Profile |
|---|---|---|
| Temperature Min. (Tsmin) | 100 | 150°C |
| Temperature Max. (Tsmax) | 150 | 200°C |
| Time (ts) from (Tsmin to Tsmax) | 60-120 seconds | 60-120 seconds |
| Ramp-up Rate (tL to tP) | 3°C/second max. | 3°C/second max. |
| Liquidous Temperature (TL) | 183°C | 217°C |
| Time (tL) Maintained Above (TL) | 60 – 150 seconds | 60 – 150 seconds |
| Peak Body Package Temperature | 235°C +0°C / -5°C | 260°C +0°C / -5°C |
| Time (tP) within 5°C of 260°C | 20 seconds | 30 seconds |
| Ramp-down Rate (TP to TL) | 6°C/second max | 6°C/second max |
| Time 25°C to Peak Temperature | 6 minutes max. | 8 minutes max. |

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