

Description

The TD356 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, TD356 series provide the most stable isolation feature.

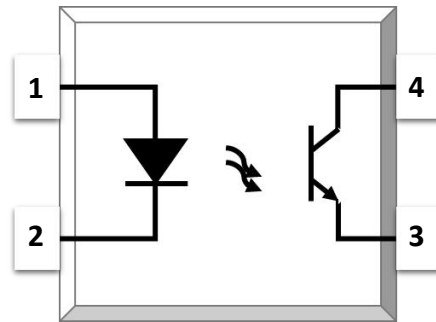
Features

- 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

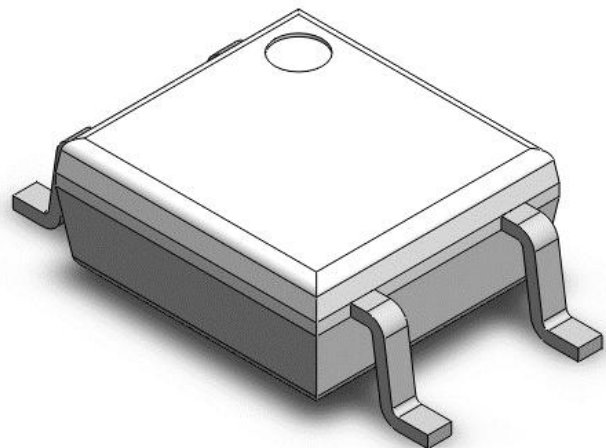
SCHEMATIC



PIN DEFINITION

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

PACKAGE OUTLINE





SOP4, DC Input Photo Transistor Coupler

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} | 80 | 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 | P_{tot} | 200 | mW | |
| Isolation Voltage | V_{iso} | 3750 | V _{rms} | 2 |
| Operating Temperature | T_{opr} | -55~110 | °C | |
| Storage Temperature | T_{stg} | -55~125 | °C | |
| Soldering Temperature | T_{sol} | 260 | °C | |

Note 1. 100µs pulse, 100Hz frequency

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



SOP4, DC Input Photo Transistor Coupler

| 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 | C _{in} | - | 10 | - | pF | V=0, f=1kHz | |
| OUTPUT | | | | | | | |
| Collector Dark Current | I _{CEO} | - | - | 100 | nA | VCE=20V, IF=0 | |
| Collector-Emitter Breakdown Voltage | BV _{CEO} | 80 | - | - | V | IC=0.1mA, IF=0 | |
| Emitter-Collector Breakdown Voltage | BV _{ECO} | 6 | - | - | V | IE=0.1mA, IF=0 | |
| TRANSFER CHARACTERISTICS | | | | | | | |
| Current Transfer Ratio | TD356 | CTR | 50 | - | 600 | % | IF=5mA, VCE=5V |
| | TD356A | | 80 | - | 160 | | |
| | TD356B | | 130 | - | 260 | | |
| | TD356C | | 200 | - | 400 | | |
| | TD356D | | 300 | - | 600 | | |
| | TD356E | | 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) | t _r | - | 3 | 18 | μs | VCE=2V, IC=2mA RL=100Ω | 3 |
| Response Time (Fall) | t _f | - | 4 | 18 | μs | | 3 |
| Cut-off Frequency | f _c | - | 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

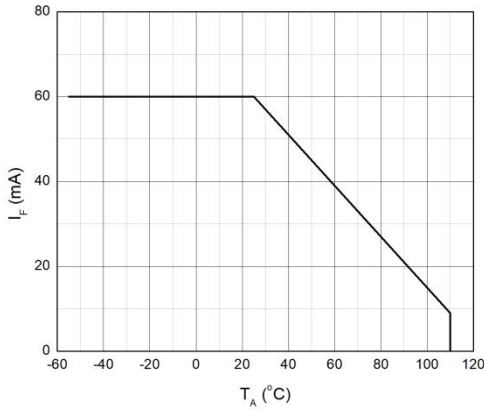


Fig.2 Collector Power Dissipation vs. Ambient Temperature

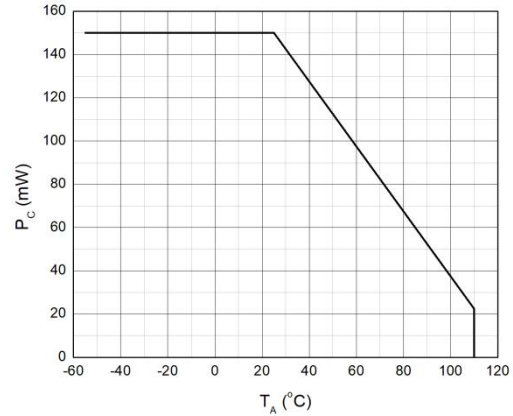


Fig.3 Forward Current vs. Forward Voltage

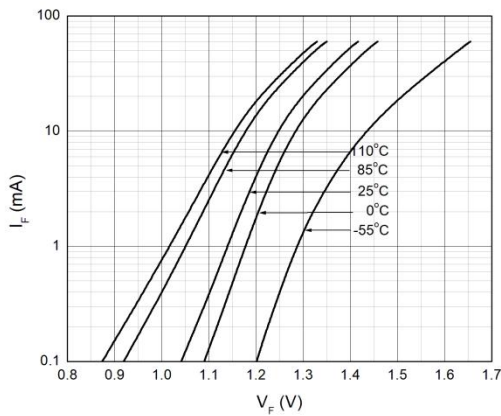


Fig.4 Collector Dark Current vs. Ambient Temperature

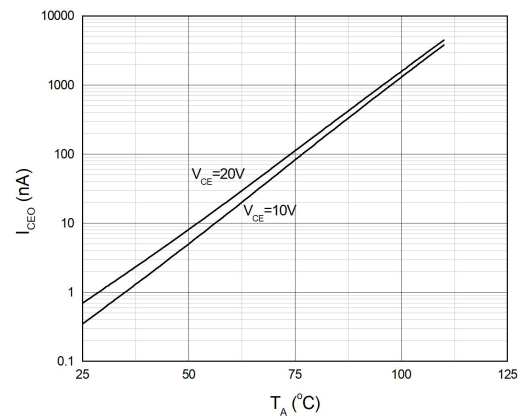


Fig.5 Collector Current vs. Collector-emitter Voltage

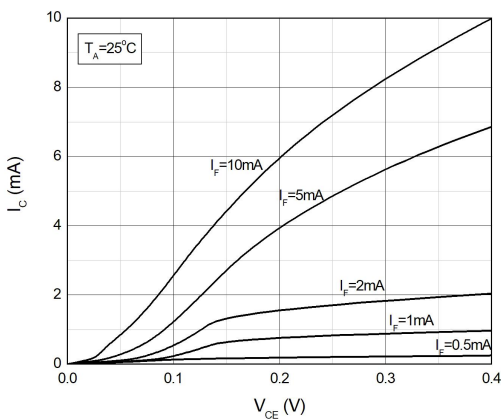
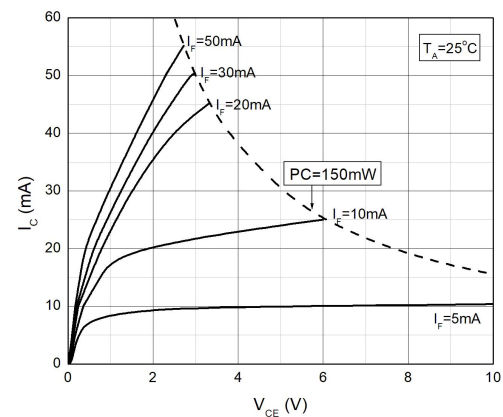


Fig.6 Collector Current vs. Collector-emitter Voltage



CHARACTERISTIC CURVES

Fig.7 Normalized Current Transfer Ratio vs. Forward Current

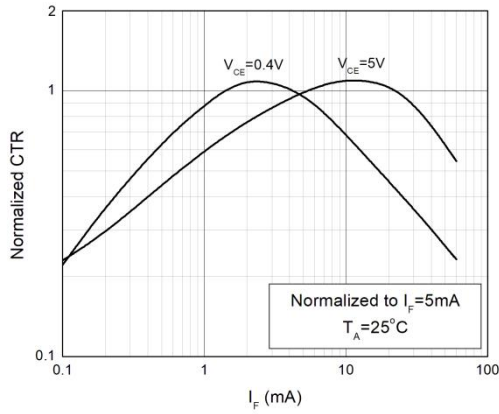


Fig.8 Normalized Current Transfer Ratio vs. Ambient Temperature

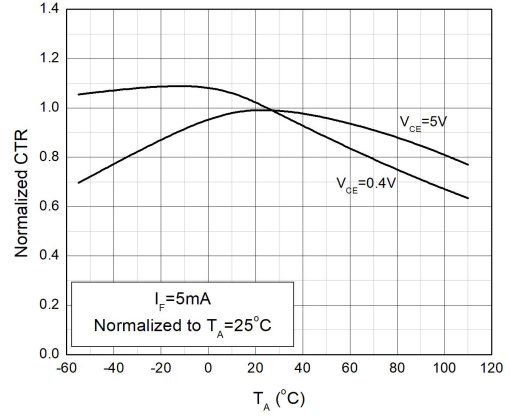


Fig.9 Collector-emitter Saturation Voltage vs. Ambient Temperature

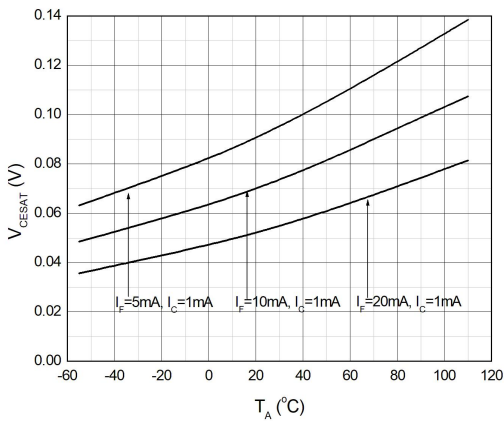


Fig.10 Switching Time vs. Load Resistance

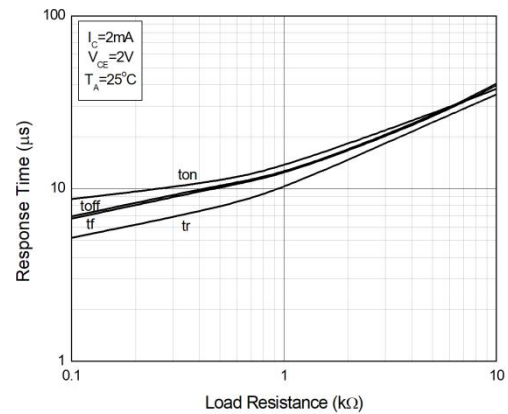
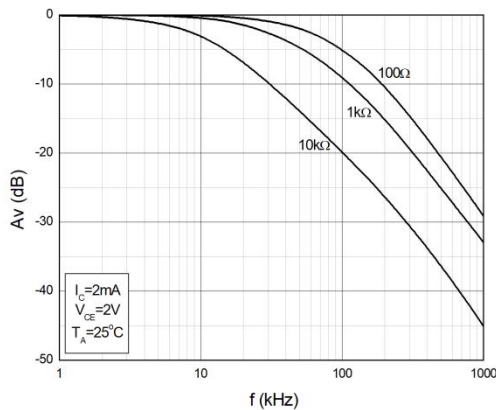


Fig.11 Frequency Response



TEST CIRCUITS

Fig.12 Test Circuits of Response Time

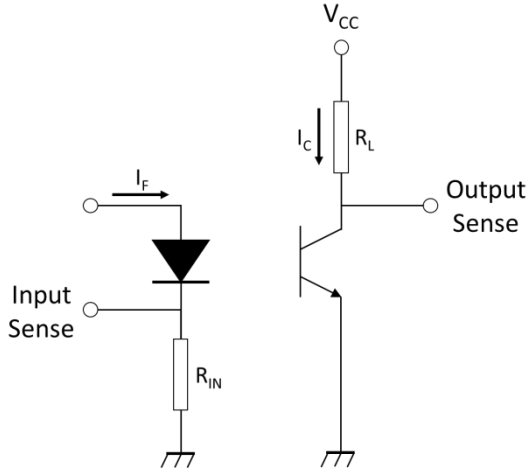


Fig.13 Curves of Response Time

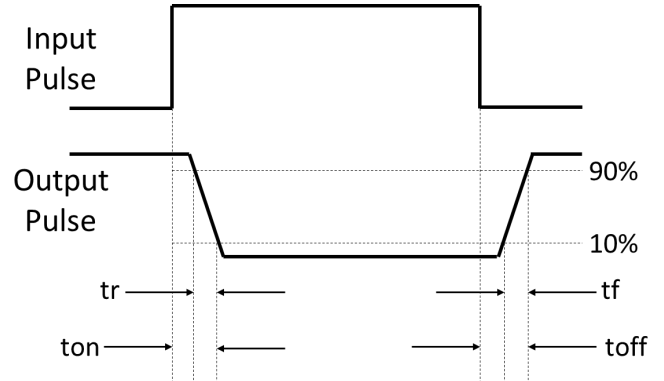
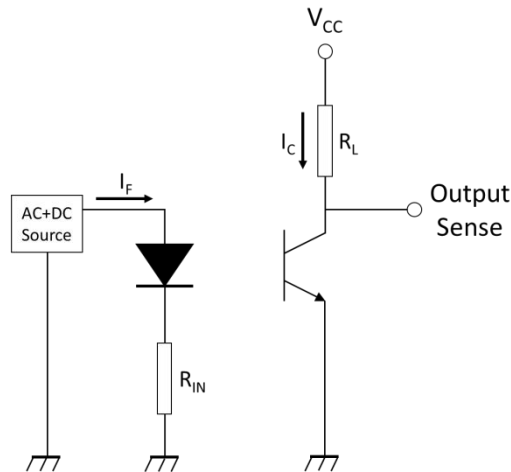
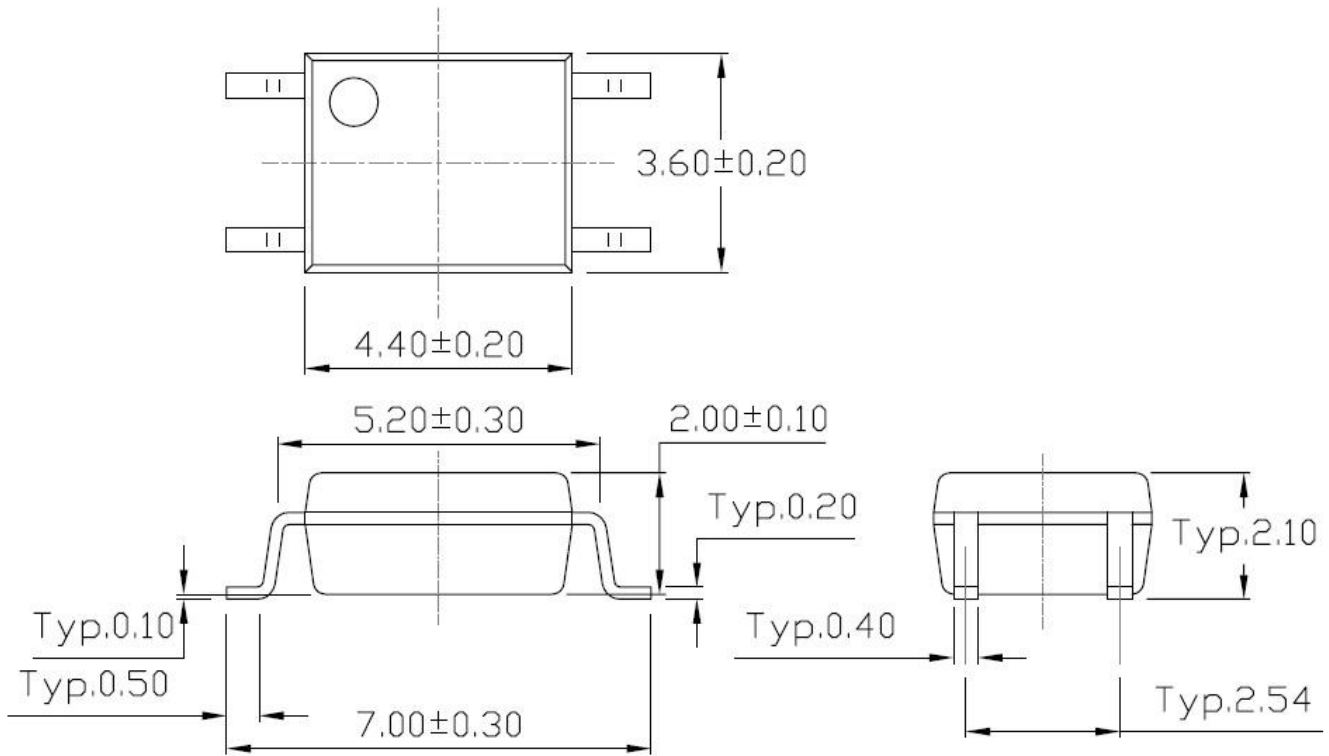


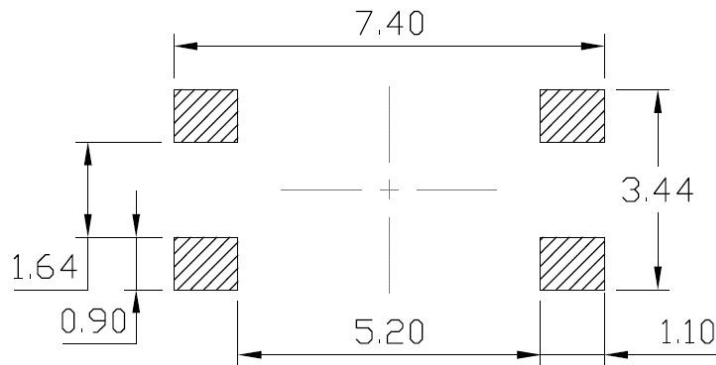
Fig.14 Test Circuits of Frequency Response



PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)

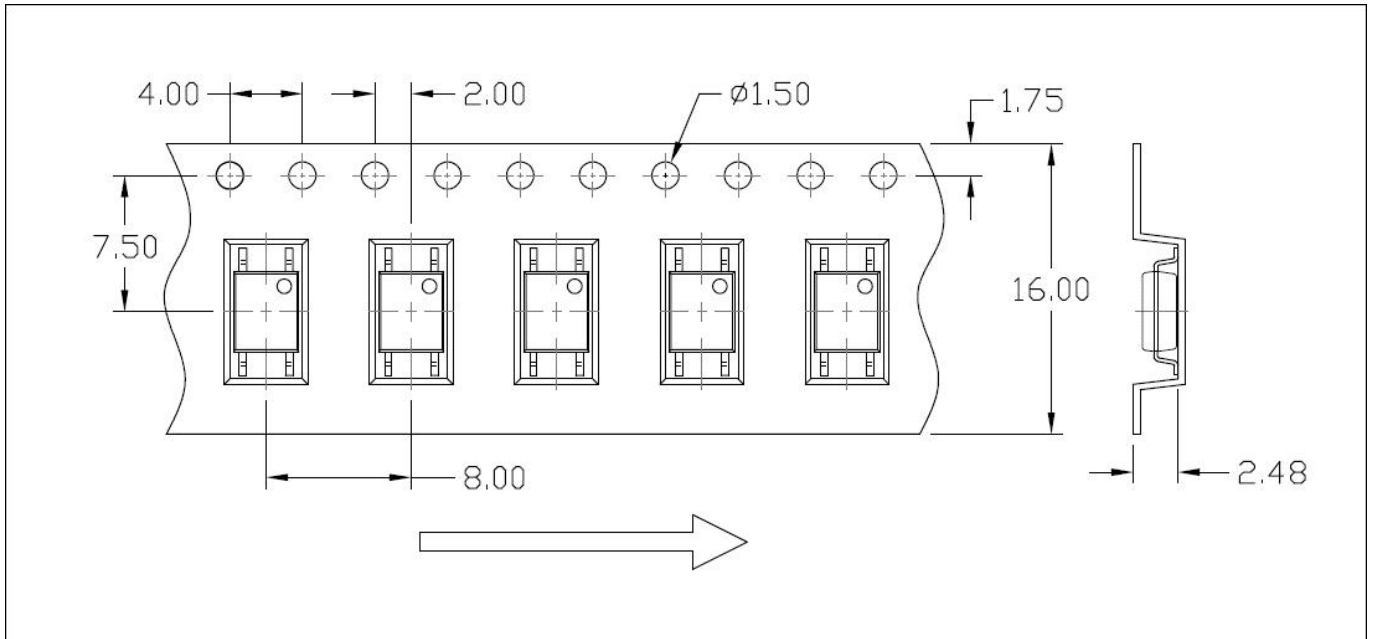


Recommended Solder Mask (Dimensions in mm unless otherwise stated)

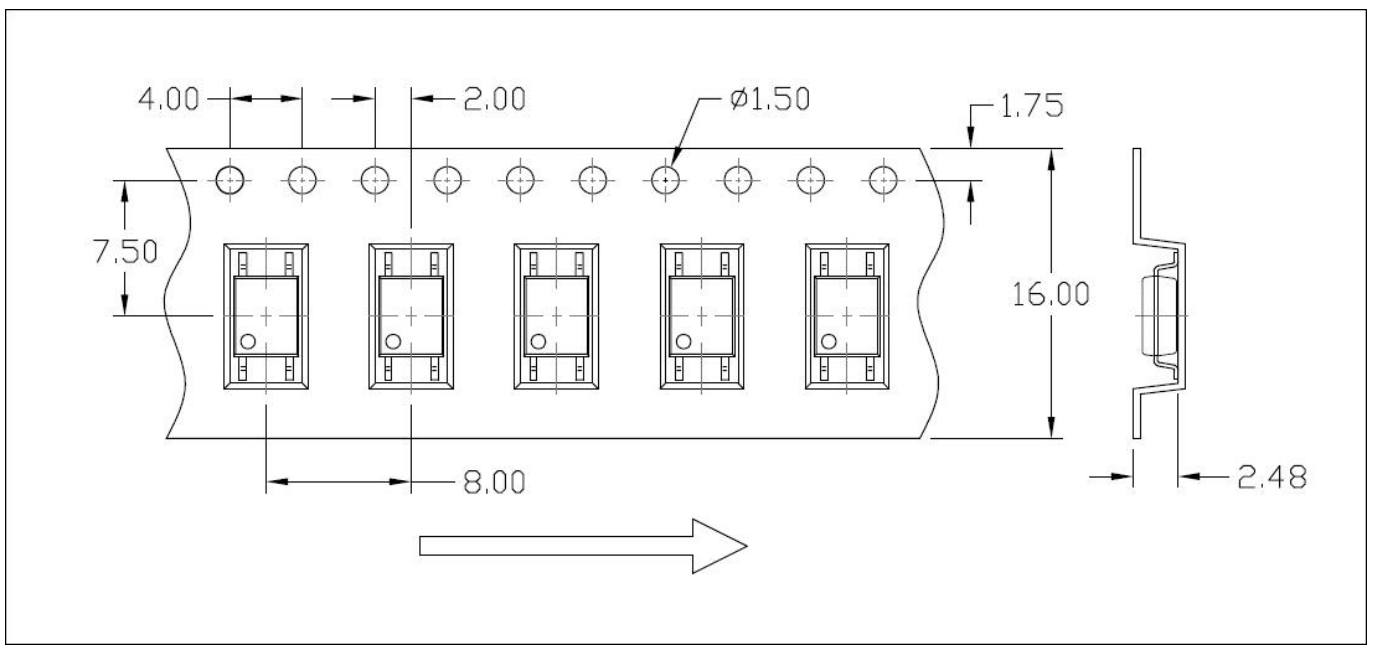


CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option T1

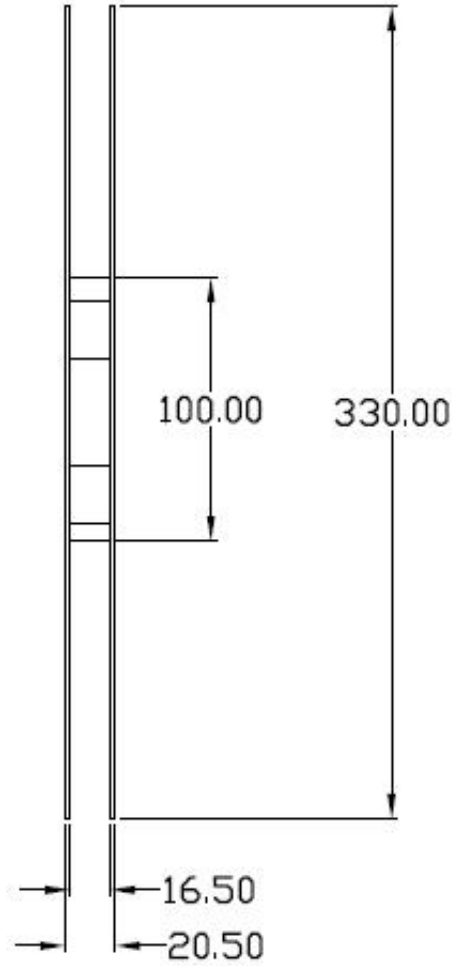
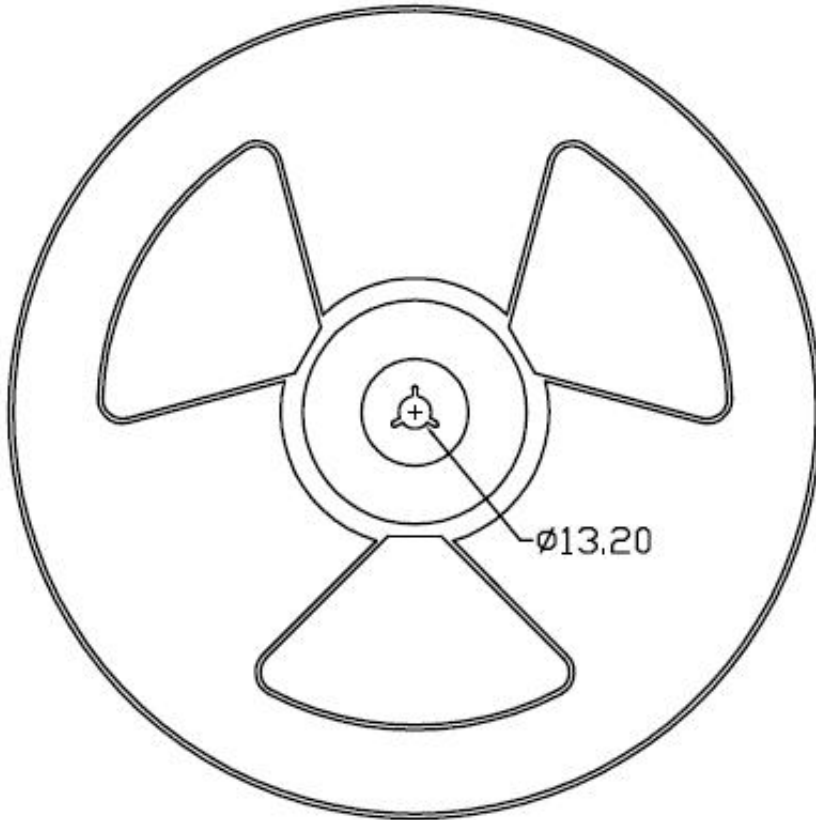


Option T2



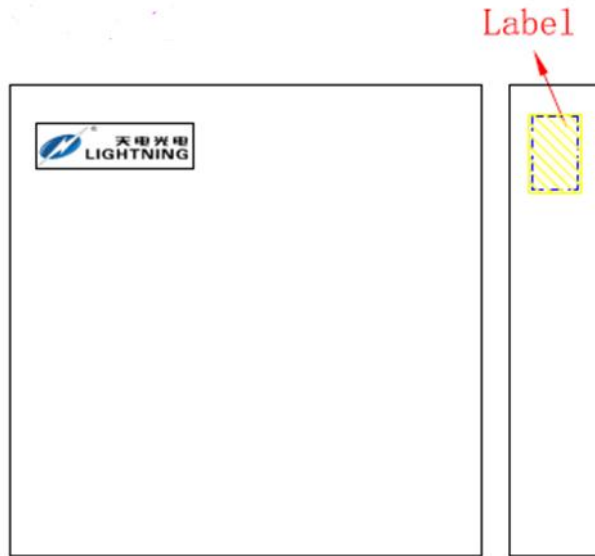
REEL SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option T1 & T2



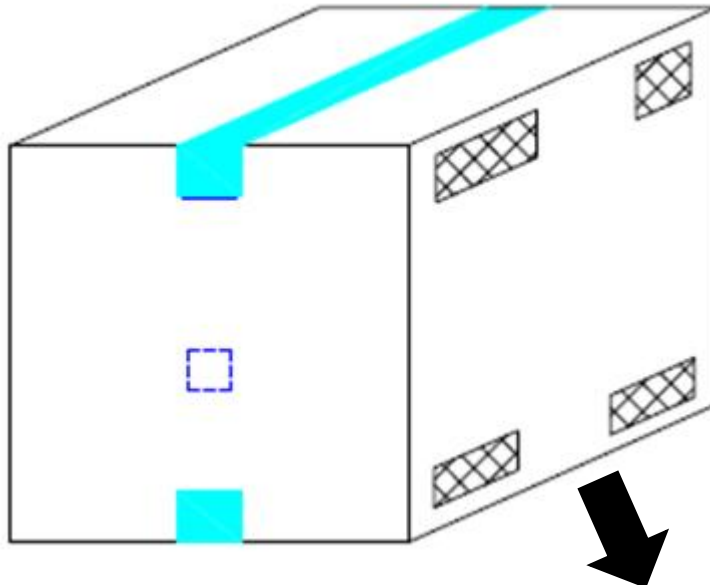
BOX SPECIFICATIONS (Reel Type)

Inner Box

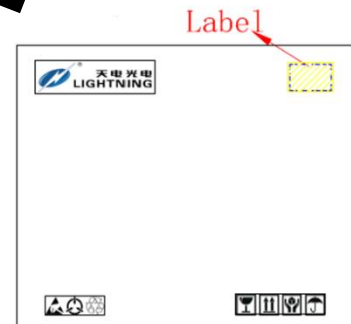


- L x W x H = 36cm x 36cm x 6.9cm

Outer Box

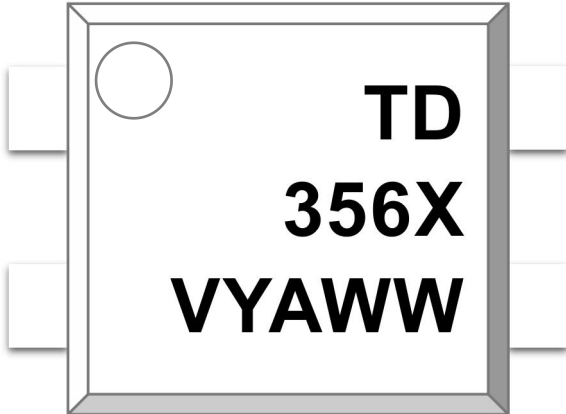


- L x W x H = 45cm x 38cm x 38cm



ORDERING AND MARKING INFORMATION

MARKING INFORMATION



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

ORDERING INFORMATION

TD356X(Z)-GV

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

LABEL INFORMATION

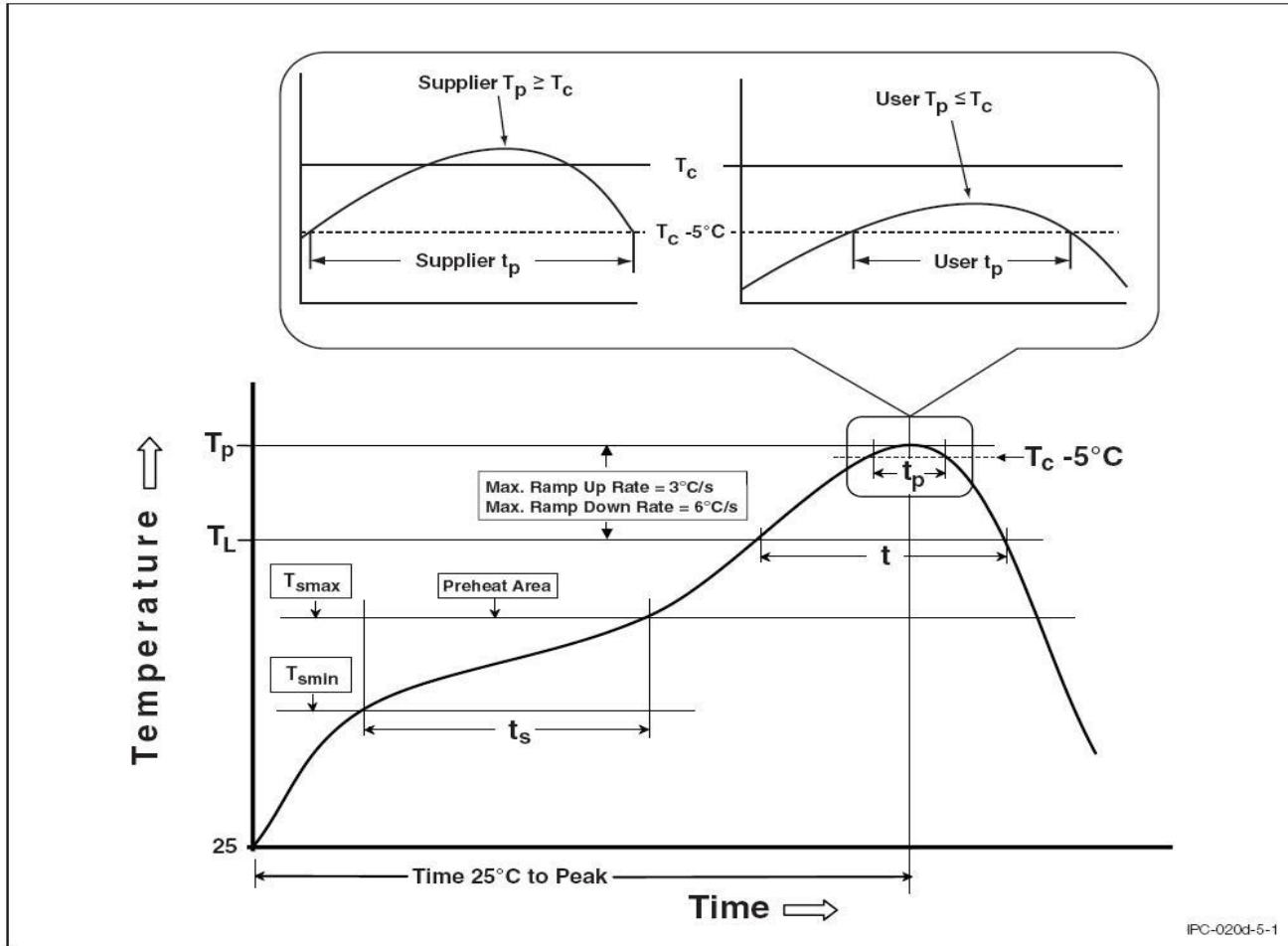


PACKING QUANTITY

| 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. (T_{smin}) | 100 | 150°C |
| Temperature Max. (T_{smax}) | 150 | 200°C |
| Time (t_s) from (T_{smin} to T_{smax}) | 60-120 seconds | 60-120 seconds |
| Ramp-up Rate (t_L to t_P) | 3°C/second max. | 3°C/second max. |
| Liquidous Temperature (T_L) | 183°C | 217°C |
| Time (t_L) Maintained Above (T_L) | 60 – 150 seconds | 60 – 150 seconds |
| Peak Body Package Temperature | 235°C +0°C / -5°C | 260°C +0°C / -5°C |
| Time (t_P) within 5°C of 260°C | 20 seconds | 30 seconds |
| Ramp-down Rate (T_P to T_L) | 6°C/second max | 6°C/second max |
| Time 25°C to Peak Temperature | 6 minutes max. | 8 minutes max. |



DISCLAIMER

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- Please contact LIGHTNING sales agent for special application request.
- Immerge unit's body in solder paste is not recommended.
- Parameters provided in datasheets may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated in each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify LIGHTNING's terms and conditions of purchase, including but not limited to the warranty expressed therein.
- Discoloration might be occurred on the package surface after soldering, reflow or long-time use. It neither impacts the performance nor reliability.