



Description

The TD101X series combine an AlGaAs infrared emitting diode as the emitter which is optically coupled to a silicon planar phototransistor detector in a plastic LSOP4 package.

With the robust coplanar double mold structure, TD101X series provide the most stable isolation feature.

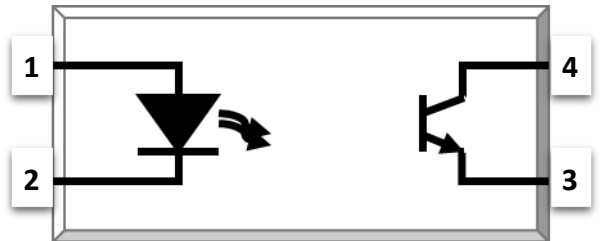
Features

- High isolation 5000 VRMS
- CTR flexibility available see order information
- DC input with transistor output
- Operating temperature range - 55 °C to 110 °C
- RoHS & REACH Compliance
- MSL class 1
- Regulatory Approvals
 - UL - UL1577
 - VDE - EN60747-5-5(VDE0884-5)
 - CQC – GB4943.1, GB8898

Applications

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

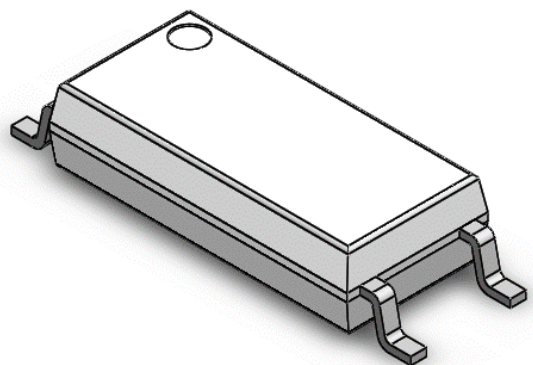
SCHEMATIC



PIN DEFINITION

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

PACKAGE OUTLINE





LSOP4, 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} | 7 | V | |
| Collector Current | I_c | 50 | mA | |
| Output Power Dissipation | P_o | 150 | mW | |
| COMMON | | | | |
| Total Power Dissipation | P_{tot} | 250 | mW | |
| Isolation Voltage | V_{iso} | 5000 | 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%



LSOP4, 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 | I _F =10mA | |
| Reverse Current | I _R | - | - | 10 | μA | V _R =6V | |
| Input Capacitance | C _{in} | - | 30 | 250 | pF | V=0, f=1kHz | |
| OUTPUT | | | | | | | |
| Collector Dark Current | I _{CEO} | - | - | 100 | nA | V _{CE} =20V, I _F =0 | |
| Collector-Emitter Breakdown Voltage | BV _{CEO} | 80 | - | - | V | I _C =0.1mA, I _F =0 | |
| Emitter-Collector Breakdown Voltage | BV _{ECO} | 7 | - | - | V | I _E =0.1mA, I _F =0 | |
| TRANSFER CHARACTERISTICS | | | | | | | |
| Current Transfer Ratio | TD1010 | CTR | 300 | - | 600 | % | I _F =5mA, V _{CE} =5V |
| | TD1015 | | 50 | - | 150 | | |
| | TD1016 | | 100 | - | 300 | | |
| | TD1017 | | 80 | - | 160 | | |
| | TD1018 | | 130 | - | 260 | | |
| | TD1019 | | 200 | - | 400 | | I _F =10mA, V _{CE} =5V |
| | TD1011 | | 60 | - | 300 | | |
| | TD1012 | | 63 | - | 125 | | |
| | TD1013 | | 100 | - | 200 | | I _F =1mA, V _{CE} =5V |
| | TD1014 | | 160 | - | 320 | | |
| | TD1012 | | 22 | - | - | | |
| | TD1013 | | 34 | - | - | | |
| | TD1014 | | 56 | - | - | | |
| Collector-Emitter Saturation Voltage | V _{CE(sat)} | - | 0.1 | 0.3 | V | I _F =10mA, I _C =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 | |
| Cut-off Frequency | F _c | - | 80 | - | kHz | V _{CE} =2V, I _C =2mA R _L =100Ω, -3dB | 3 |
| Response Time (Rise) | Tr | - | 5 | 18 | μs | V _{CE} =2V, I _C =2mA R _L =100Ω | 4 |
| Response Time (Fall) | Tf | - | 6 | 18 | μs | | 4 |

Note 3. Fig.12&13

Note 4. Fig.14



CHARACTERISTIC CURVES

Fig.1 Forward Current vs. Ambient Temperature

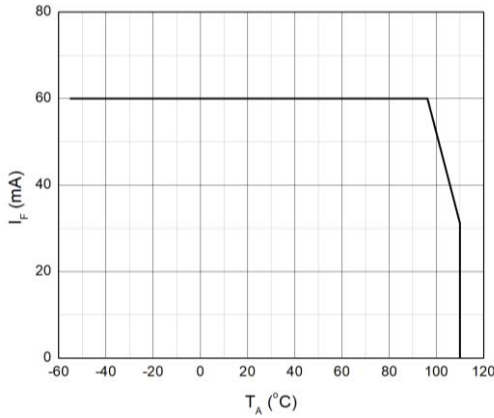


Fig.2 Collector Power Dissipation vs. Ambient Temperature

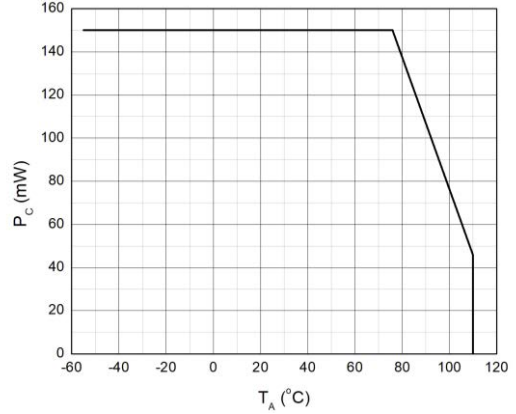


Fig.3 Forward Current vs. Forward Voltage

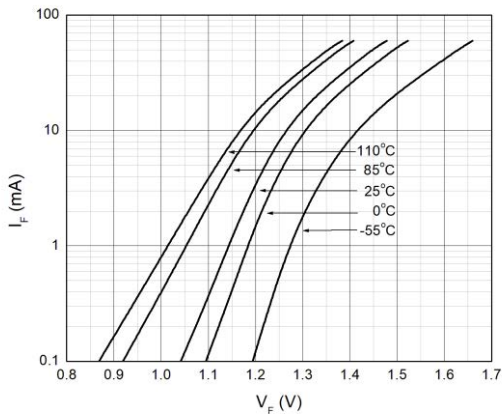


Fig.4 Collector Dark Current vs. Ambient Temperature

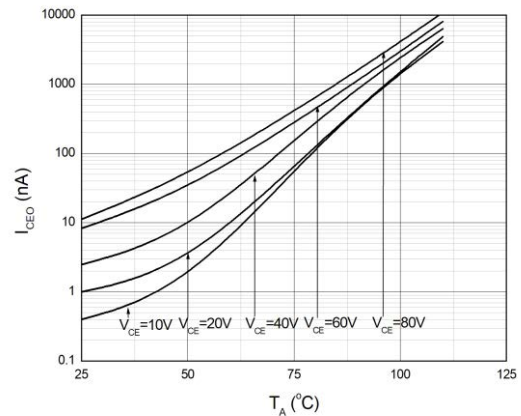


Fig.5 Collector Current vs. Collector-emitter Voltage

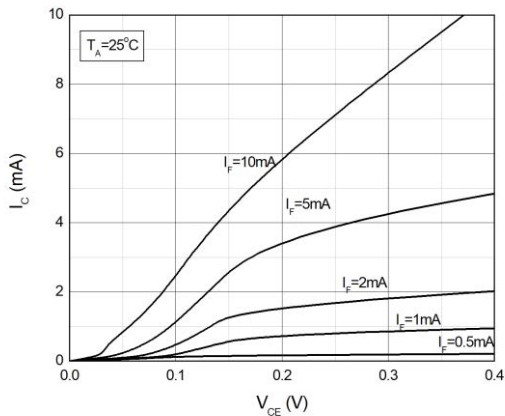
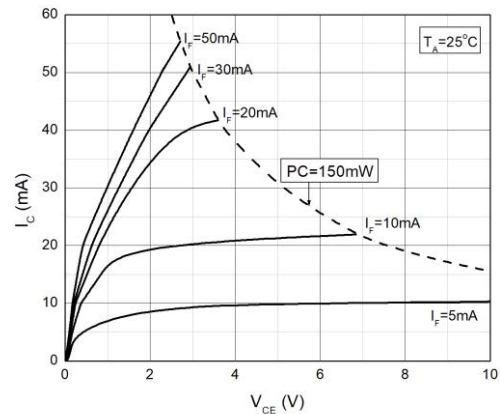


Fig.6 Collector Current vs. Collector-emitter Voltage



CHARACTERISTIC CURVES

Fig.7 Normalized Current Transfer Ratio vs. Forward Current

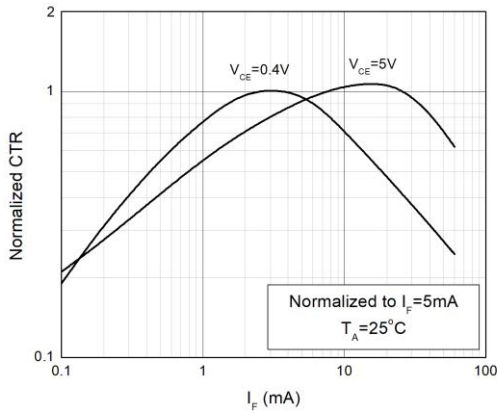


Fig.8 Normalized Current Transfer Ratio vs. Ambient Temperature

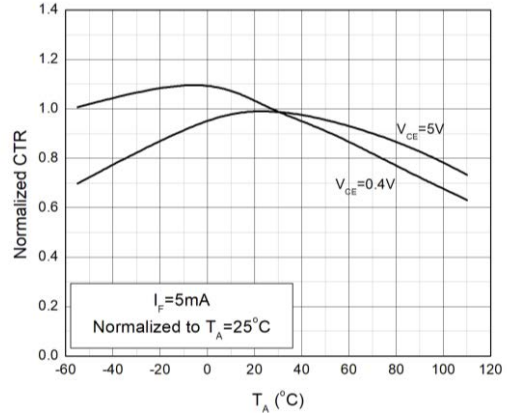


Fig.9 Collector-emitter Saturation Voltage vs. Ambient Temperature

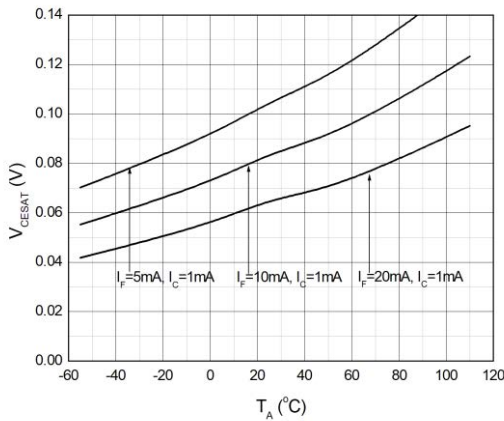


Fig.10 Switching Time vs. Load Resistance

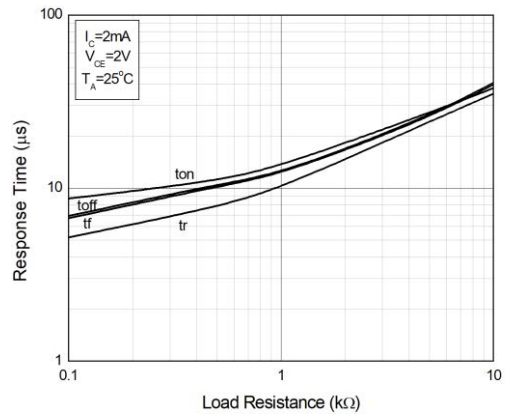
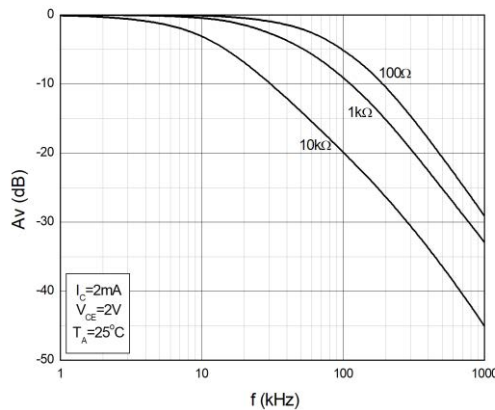


Fig.11 Frequency Response



TEST CIRCUITS

Fig.12 Test Circuits of Response Time

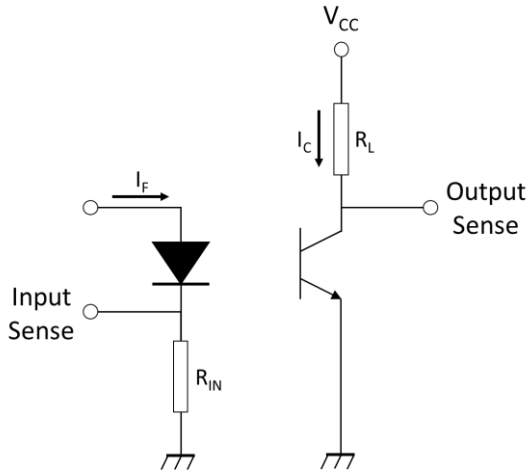


Fig.13 Curves of Response Time

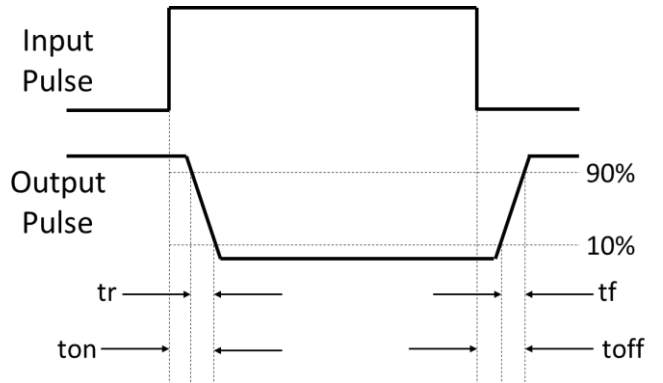
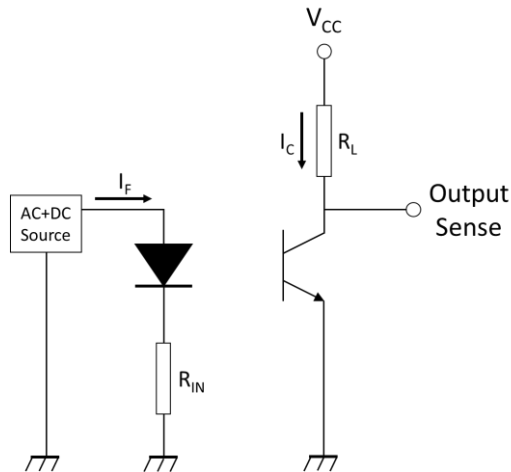
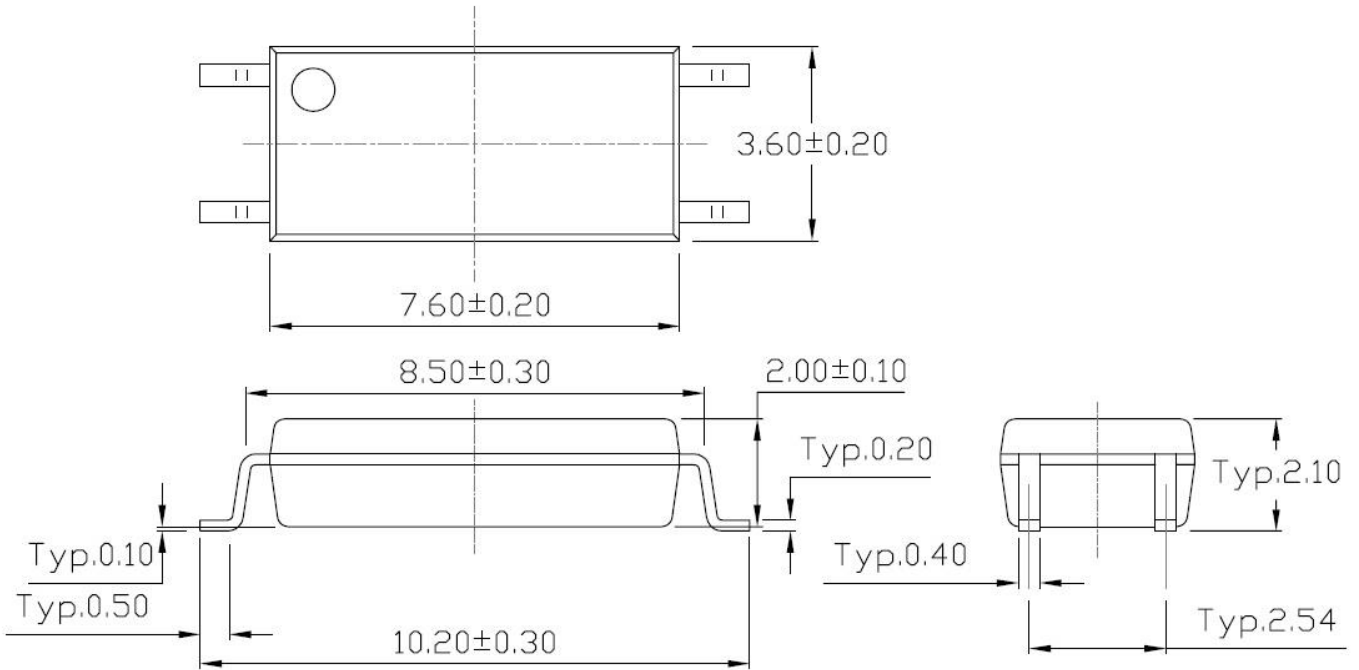


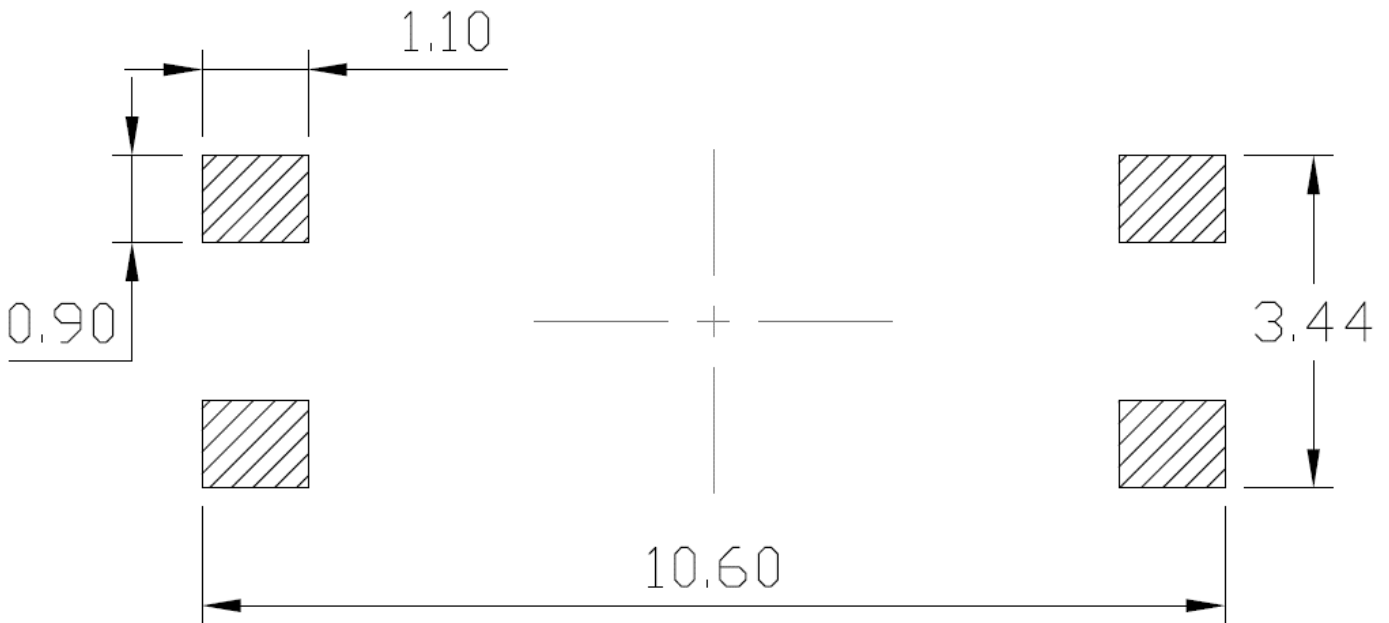
Fig.14 Test Circuits of Frequency Response



PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)

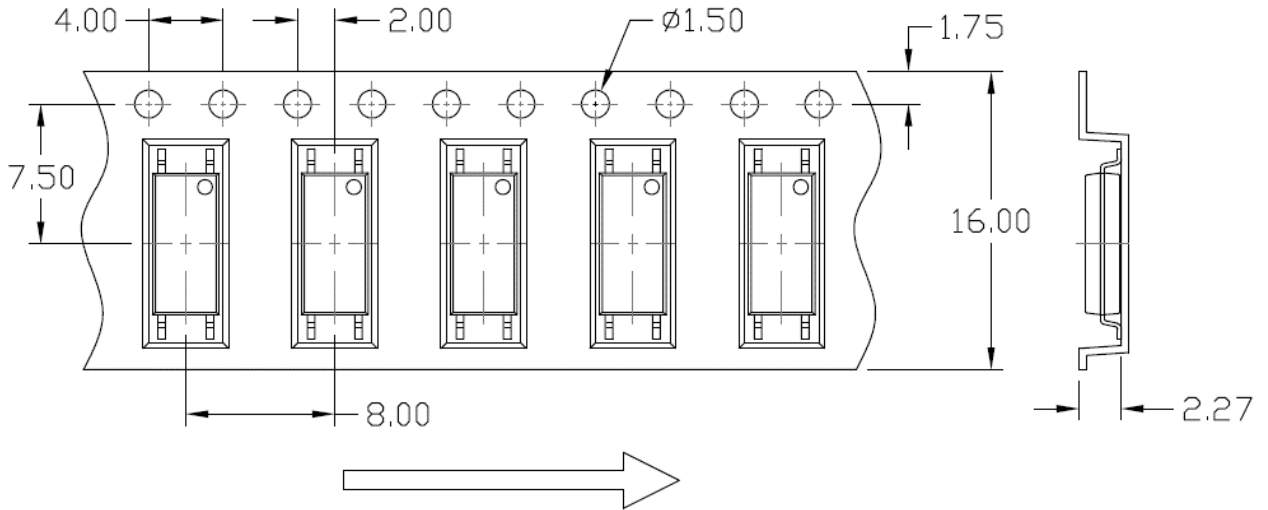


RECOMMENDED SOLDER MASK (Dimensions in mm unless otherwise stated)

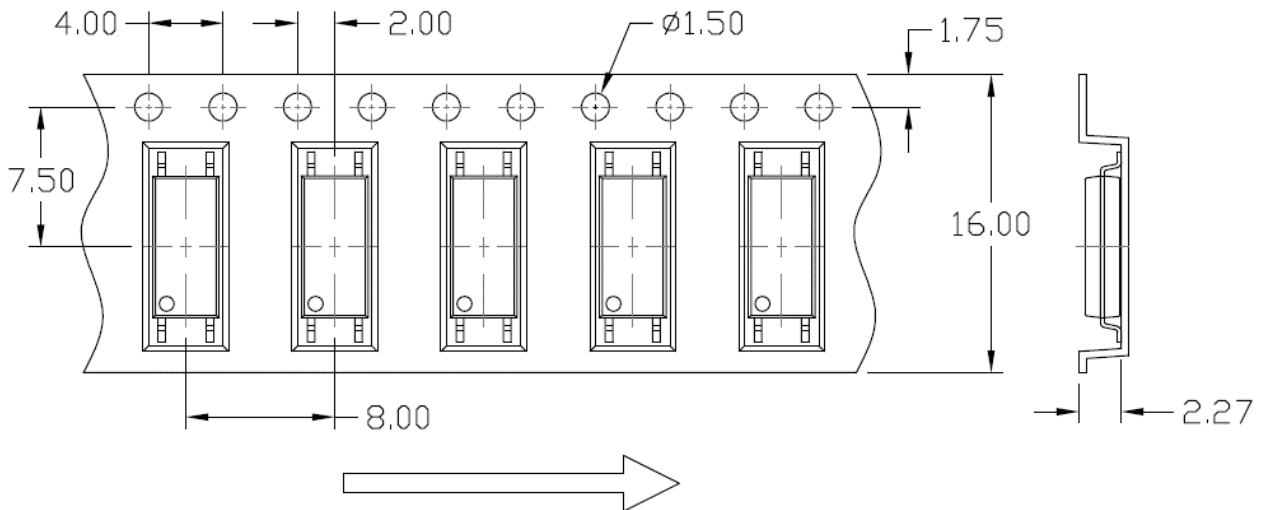


CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option T1



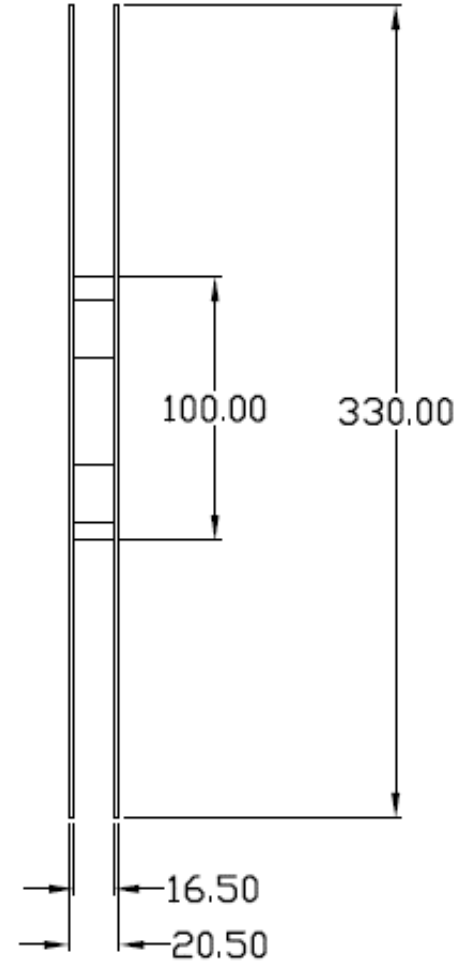
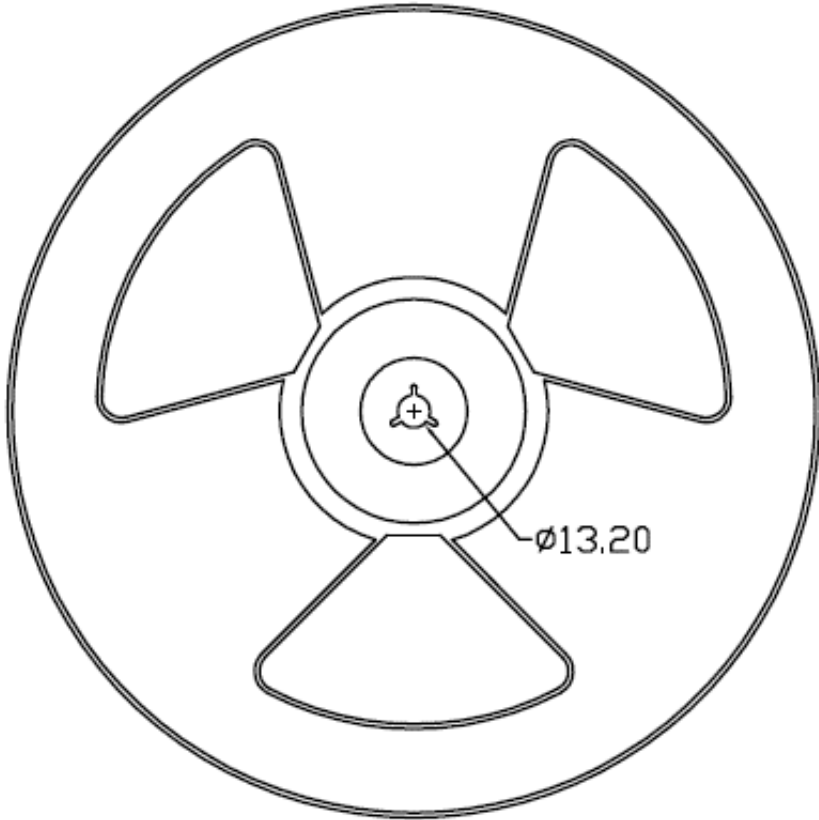
Option T2





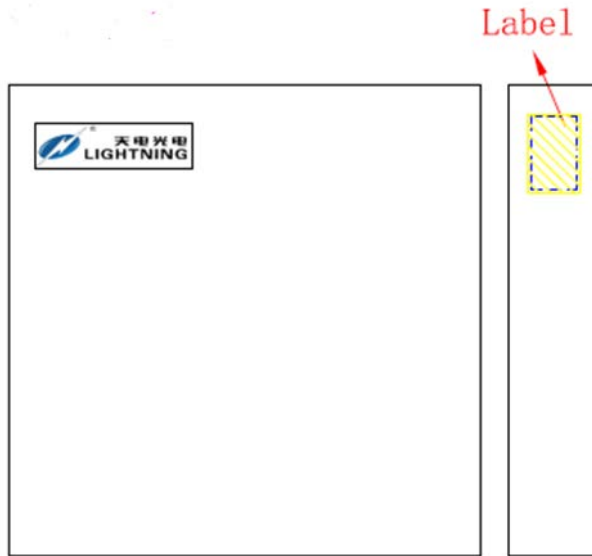
REEL SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option T1 & T2



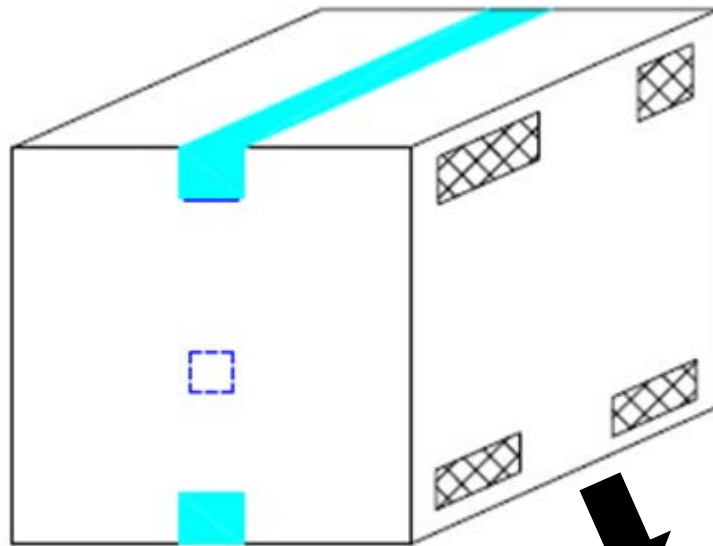
BOX SPECIFICATIONS (Reel Type)

Inner Box

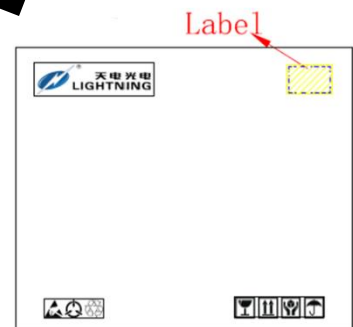


- L x W x H = 36cm x 36cm x 6.9cm

Outer Box



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





ORDERING AND MARKING INFORMATION

MARKING INFORMATION



TD : Company Abbr.
101X : Part Number & Rank
V : VDE Option
Y : Fiscal Year
A : Manufacturing Code
WW : Work Week

ORDERING INFORMATION

LABEL INFORMATION

TD101X(Z)-GV

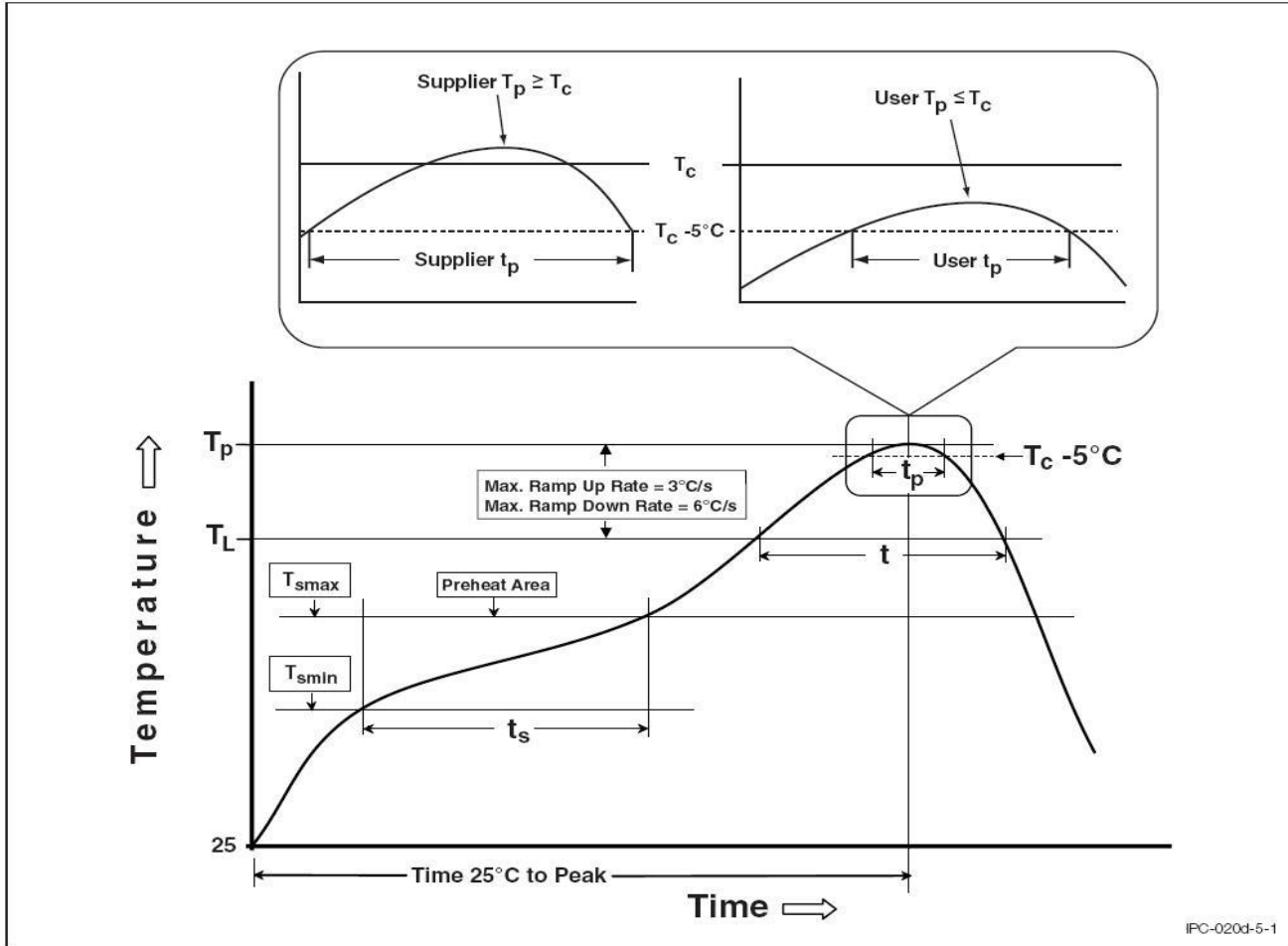
TD – Company Abbr.
 101X – Rank (0/1/2/3/4/5/6/7/8/9)
 Z – Tape and Reel Option (T1/T2)
 G – Green
 V – VDE Option (V or None)

福建天电光电有限公司
 FUJIAN LIGHTNING OPTOELECTRONIC CO., LTD.
 Part No : XXXXXXXXXXXXXXXX Bin Code : X
 Lot No : XXXXXXXXXXXX
 Date Code : XXXX
 Q'ty : XXXX pcs

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 |

TEMPERATURE PROFILE OF SOLDERING
IR REFLOW SOLDERING (J-STD-020D COMPLIANT)



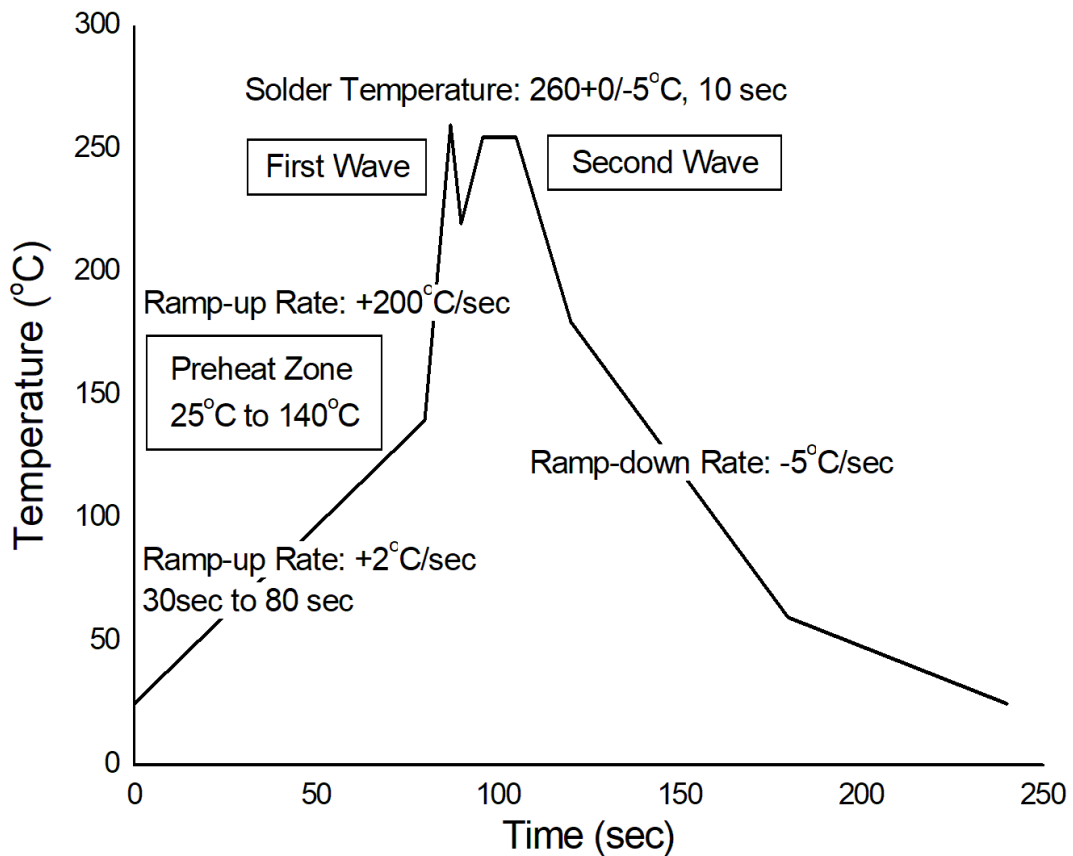
IPC-020d-5-1

| 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. |



TEMPERATURE PROFILE OF SOLDERING

WAVE SOLDERING (JESD22-A111 COMPLIANT)



HAND SOLDERING BY SOLDERING IRON

| | |
|-----------------------|--------------------------------|
| Soldering Temperature | $380 \pm 0/-5^{\circ}\text{C}$ |
| Soldering Time | 3 sec max. |

- One time soldering is recommended for all soldering method.
- Do not solder more than three times for IR reflow soldering.



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- This product is not intended to be used for military, aircraft, automotive, medical, life sustaining or lifesaving applications or any other application which can result in human injury or death.
- Please contact LIGHTNING sales agent for special application request.
- Immerge unit's body in solder paste is not recommended.
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