



# CT3051-5L, CT3052-5L, CT3053-5L 600V Random Phase 5-Pin DMC-Isolator® Phototriac Optocoupler

## Features

- High isolation 5000 VRMS
- Patented coplanar structure DMC-Isolator®
- Peak Breakdown Voltage 600V
- Operating Temperature range - 55 °C to 100 °C
- External Creepage  $\geq 7.4\text{mm}$
- Distance Through Isolation  $\geq 0.4\text{mm}$
- Clearance Distance  $\geq 7.5\text{mm}$  ( S/SL Type)
- Clearance Distance  $\geq 8.0\text{mm}$  ( M Type)
- RoHS and REACH Compliance
- Halogen Free Compliance (Optional)
- MSL class 1
- Regulatory Approvals
  - ✓ UL - UL1577 (E364000)
  - ✓ VDE - EN60747-5-5 (40039590)
  - ✓ CQC – GB4943.1, GB8898 (14001105802)
  - ✓ IEC62368 (FI/41119)

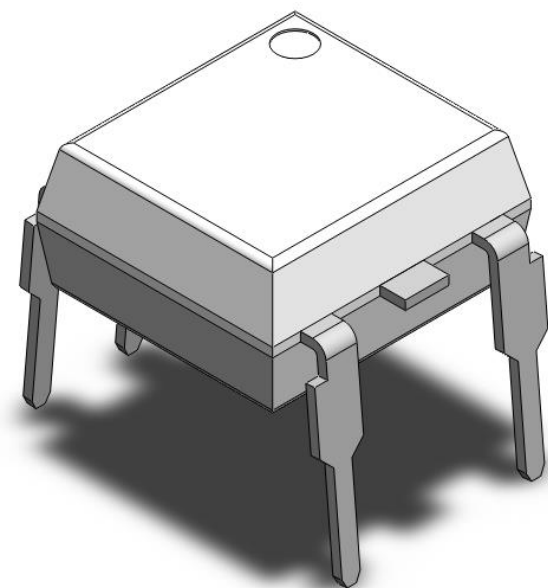
## Description

The CT3051-5L, CT3052-5L, and CT3053-5L series consist of a Random Phase Photo Triac optically coupled to an Infrared-emitting diode in a 5-lead DIP package DMC-Isolator® with different lead forming options.

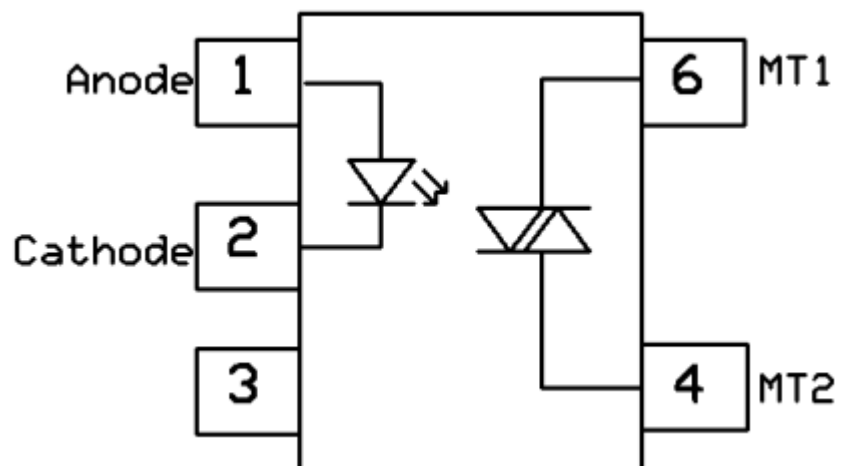
## Applications

- Motor Controls
- Lamp ballasts
- Static AC Power Switch
- Solenoid/ Valve Control

## Package Outline



## Schematic



Note: Different bending options available. See package dimension.



# CT3051-5L, CT3052-5L, CT3053-5L

## 600V Random Phase 5-Pin DMC-Isolator®

### Phototriac Optocoupler

#### Absolute Maximum Ratings $T_A = 25^{\circ}\text{C}$ , unless otherwise specified

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

| Symbol                | Parameters                                      | Ratings    | Units            | Notes |
|-----------------------|---|------------|------------------|-------|
| V <sub>ISO</sub>      | Isolation voltage (AC, 1 minute, 40 ~ 60% R.H.) | 5000       | V <sub>RMS</sub> |       |
| T <sub>OPR</sub>      | Operating temperature                           | -55 ~ +100 | °C               |       |
| T <sub>STG</sub>      | Storage temperature                             | -55 ~ +150 | °C               |       |
| T <sub>SOL</sub>      | Soldering temperature (For 10 seconds)          | 260        | °C               |       |
| T <sub>J</sub>        | Junction temperature                            | 115        | °C               |       |
| <b>Emitter</b>        |   |            |                  |       |
| I <sub>F</sub>        | Forward current                                 | 60         | mA               |       |
| I <sub>F(TRANS)</sub> | Peak transient current (≤1μs P.W,300pps)        | 1          | A                |       |
| V <sub>R</sub>        | Reverse voltage                                 | 6          | V                |       |
| P <sub>D</sub>        | Power dissipation                               | 100        | mW               |       |
| <b>Detector</b>       |   |            |                  |       |
| P <sub>D</sub>        | Power dissipation                               | 300        | mW               |       |
| V <sub>DRM</sub>      | Off-State Output Terminal Voltage               | 600        | V                |       |
| I <sub>TM</sub>       | RMS on-state current                            | 100        | mA               |       |
| I <sub>TSM</sub>      | Peak Repetitive Surge Current                   | 1          | A                |       |



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## Electrical Characteristics $T_A = 25^\circ\text{C}$ , unless otherwise specified

### Emitter Characteristics

| Symbol   | Parameters        | Test Conditions     | Min | Typ  | Max | Units         | Notes |
|----------|-------------------|---------------------|-----|------|-----|---------------|-------|
| $V_F$    | Forward voltage   | $I_F = 10\text{mA}$ | -   | 1.24 | 1.5 | V             |       |
| $I_R$    | Reverse Current   | $V_R = 6\text{V}$   | -   | -    | 5   | $\mu\text{A}$ |       |
| $C_{IN}$ | Input Capacitance | $f = 1\text{MHz}$   | -   | 45   | -   | pF            |       |

### Detector Characteristics

| Symbol    | Parameters                              | Test Conditions  | Min  | Typ | Max | Units                  | Notes |
|-----------|---|--|------|-----|-----|------------------------|-------|
| $I_{DRM}$ | Peak Blocking Current                   | $I_F = 0\text{mA}$ , $V_{DRM} = \text{Rated } V_{DRM}$ | -    | -   | 100 | nA                     |       |
| $V_{TM}$  | Peak On-State Voltage                   | $I_F = \text{Rated } I_{FT}$ , $I_{TM} = 100\text{mA}$ | -    | -   | 2.5 | V                      |       |
| dv/dt     | Critical Rate of Rise off-State Voltage | $V_{PEAK} = \text{Rated } V_{DRM}$                     | 1000 | -   | -   | $\text{V}/\mu\text{s}$ |       |

### Transfer Characteristics

| Symbol   | Parameters            | Test Conditions  | Min  | Typ  | Max | Units         | Notes |
|----------|-----------------------|--|--|------|-----|---------------|-------|
| $I_{FT}$ | Input Trigger Current | CT3051-5L  | Terminal Voltage = 3V<br>$I_{TM} = 100\text{mA}$ | -    | -   | 15            | mA    |
|          |                       | CT3052-5L  |  | -    | -   | 10            |       |
|          |                       | CT3053-5L  |  | -    | -   | 5             |       |
| $I_H$    | Holding Current       | Terminal Voltage from "ON" to "OFF"<br>"ON" state $I_F = 0\text{mA}$ | -  | 250  | -   | $\mu\text{A}$ |       |
| $R_{IO}$ | Isolation Resistance  | $V_{IO} = 500\text{V}_{DC}$ , 40 ~ 60% R.H.                          | $1 \times 10^{11}$                               | -    | -   | $\Omega$      |       |
| $C_{IO}$ | Isolation Capacitance | $f = 1\text{MHz}$  | -  | 0.25 | -   | pF            |       |

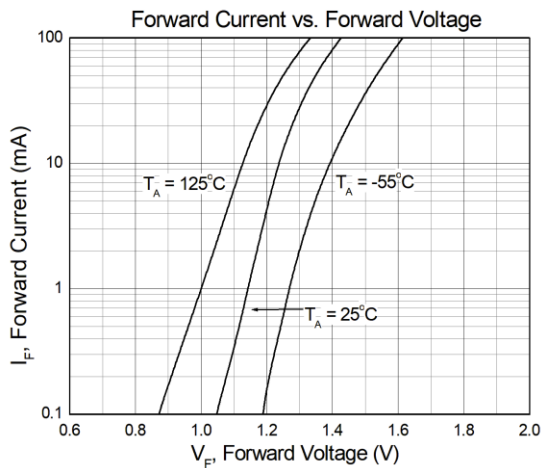


# CT3051-5L, CT3052-5L, CT3053-5L

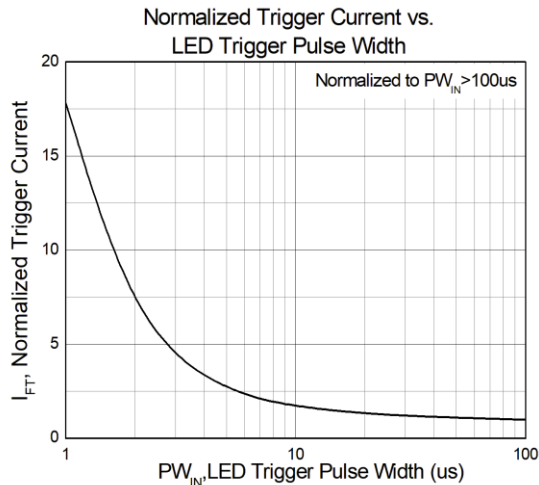
## 600V Random Phase 5-Pin DMC-Isolator®

### Phototriac Optocoupler

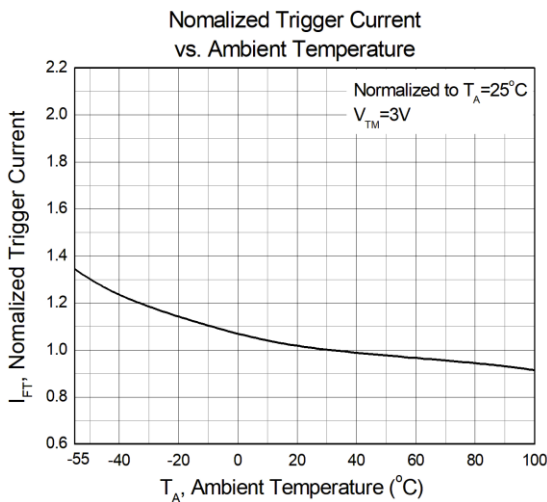
#### Typical Characteristic Curves $T_A = 25^\circ\text{C}$ , unless otherwise specified (Continued)



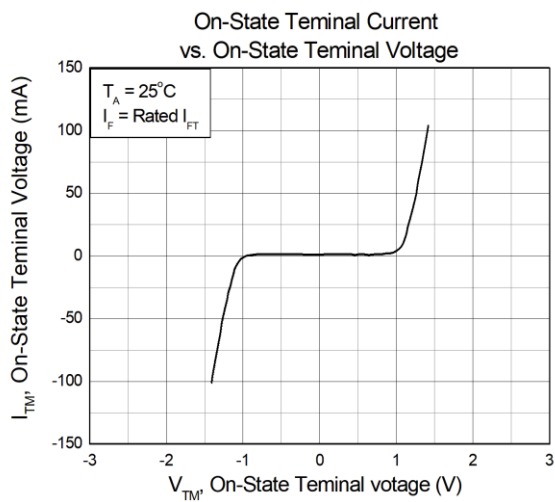
**Figure 1**



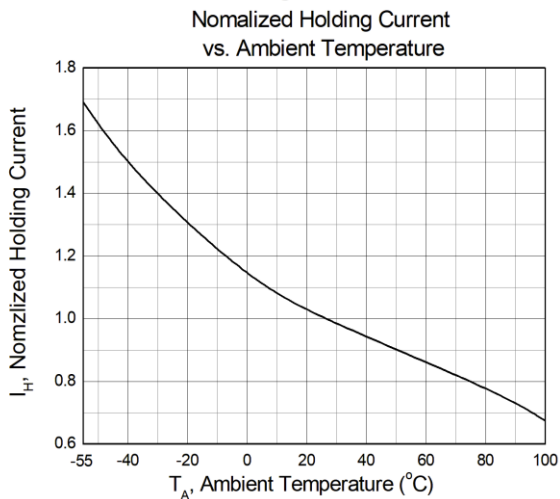
**Figure 2**



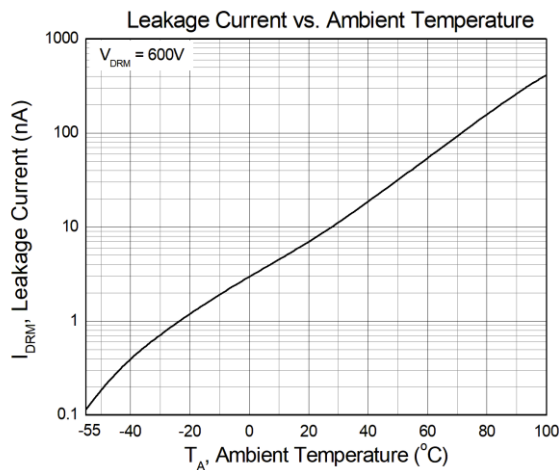
**Figure 3**



**Figure 4**



**Figure 5**



**Figure 6**



# CT3051-5L, CT3052-5L, CT3053-5L 600V Random Phase 5-Pin DMC-Isolator® Phototriac Optocoupler

## Typical Characteristic Curves $T_A = 25^\circ\text{C}$ , unless otherwise specified (Continued)

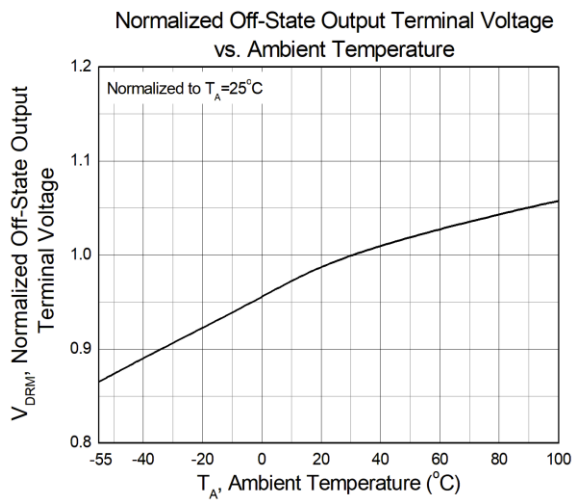


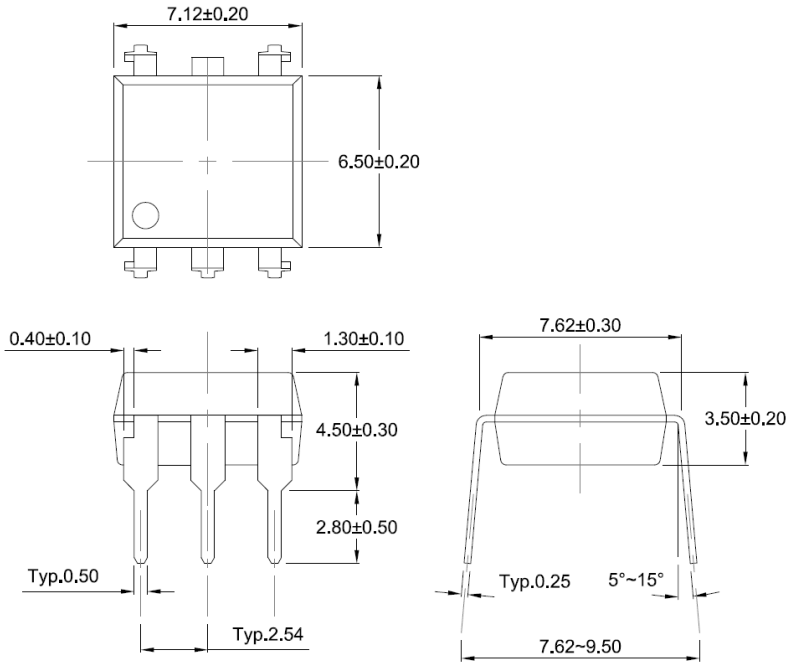
Figure 7



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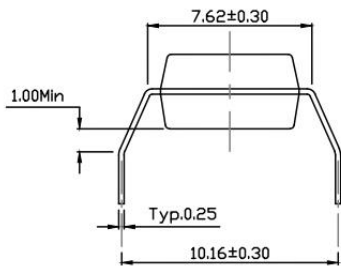
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## Package Dimension *Dimensions in mm unless otherwise stated*

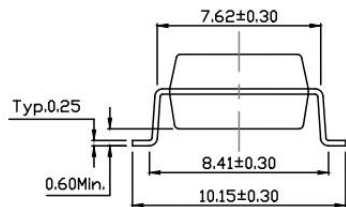


## Forming Option *Dimensions in mm unless otherwise stated*

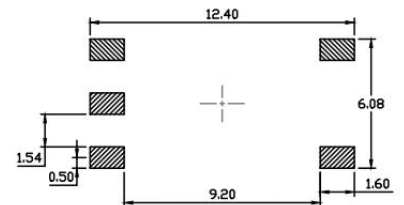
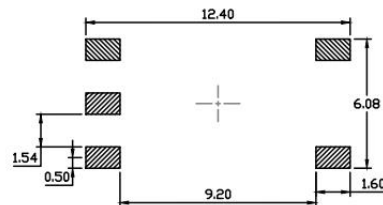
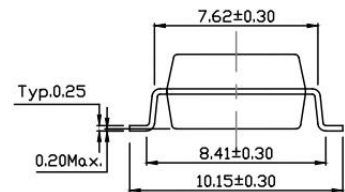
M Type



S Type



SL Type

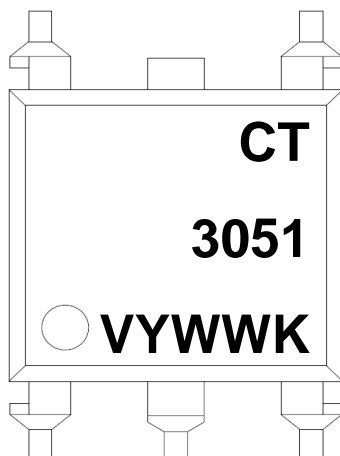




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# CT3051-5L, CT3052-5L, CT3053-5L 600V Random Phase 5-Pin DMC-Isolator® Phototriac Optocoupler

## Marking Information



Note:

- CT : Denotes “CT Micro”
- 3051 : Part Number
- X : CTR Rank Option (Blank, A or B)
- V : VDE Safety Mark Option (Blank or V)
- Y : One Digit Year Code
- WW : Two Digit Work Week
- K : Manufacturing Code

## Ordering Information

CT305X(V)(Y)(Z)-5L-G

- CT = Denotes “CT Micro”
- 305X = Part Numbers (Current Ration Option X= 1, 2 or 3)
- V = VDE Safety Mark Option (Blank or V)
- Y = Lead Form Option (Blank, S, SL or M)
- Z = Tape and Reel Option (Blank, T1 or T2)
- 5L = 5 PIN Lead Frame
- G = Material Option (G: Halogen Free, Blank: Non-Halogen Free)

| <b>Option</b> | <b>Description</b>  | <b>Quantity</b> |
|---------------|---|-----------------|
| None          | Standard 6 Pin Dip  | 50Units/Tube    |
| M             | Gullwing (400mil) Lead Forming                                  | 50Units/Tube    |
| S(T1)         | Surface Mount Lead Forming – With Option 1 Taping               | 1000 Units/Reel |
| S(T2)         | Surface Mount Lead Forming – With Option 2 Taping               | 1000 Units/Reel |
| SL(T1)        | Surface Mount (Low Profile) Lead Forming – With Option 1 Taping | 1000 Units/Reel |
| SL(T2)        | Surface Mount (Low Profile) Lead Forming – With Option 2 Taping | 1000 Units/Reel |

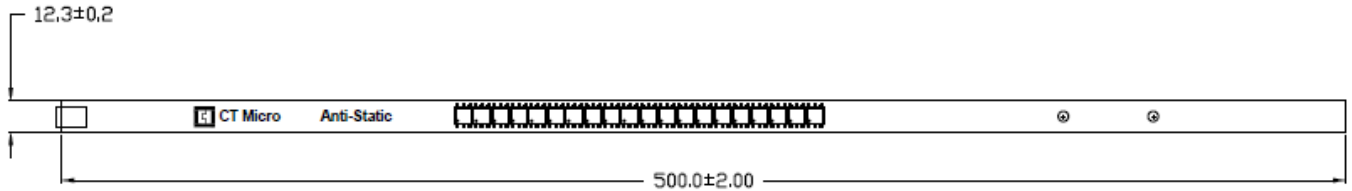


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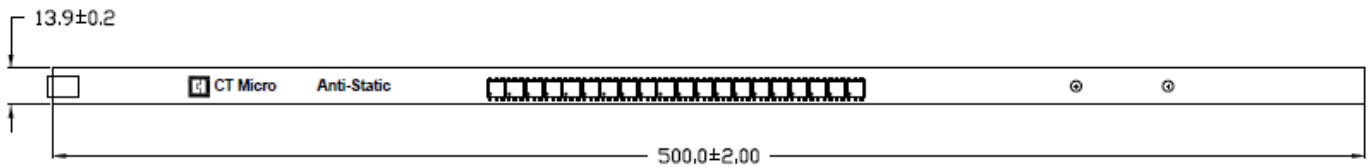
# CT3051-5L, CT3052-5L, CT3053-5L 600V Random Phase 5-Pin DMC-Isolator® Phototriac Optocoupler

## Carrier Specifications *Dimensions in mm unless otherwise stated*

### Tube Option Standard DIP

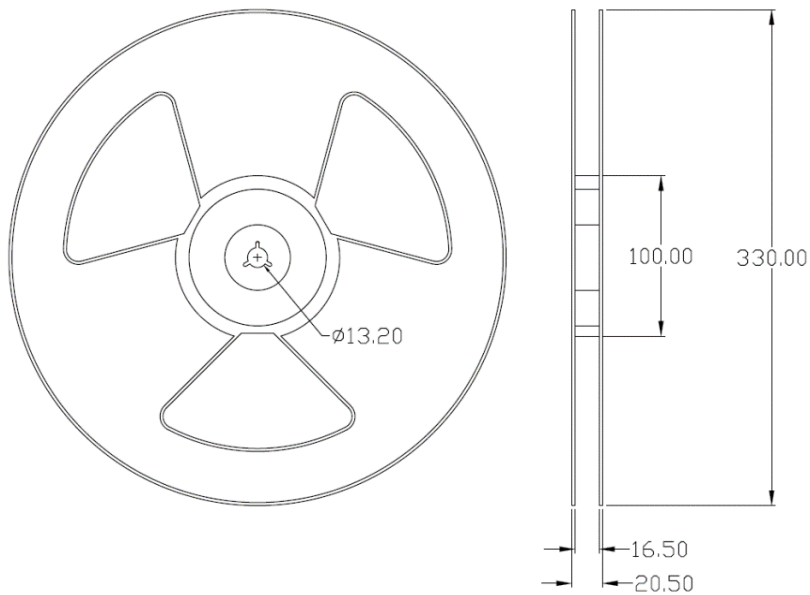


### Tube Option M Type



## Reel Dimension *All dimensions are in mm, unless otherwise stated*

### Option S(T1/T2) & SL(T1/T2)





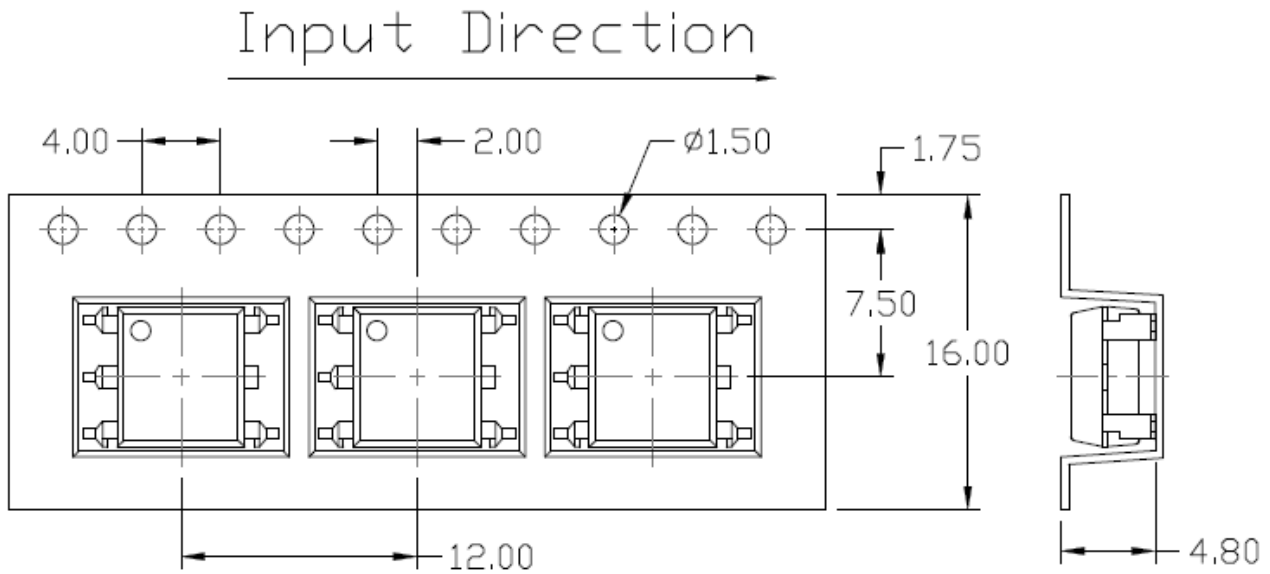


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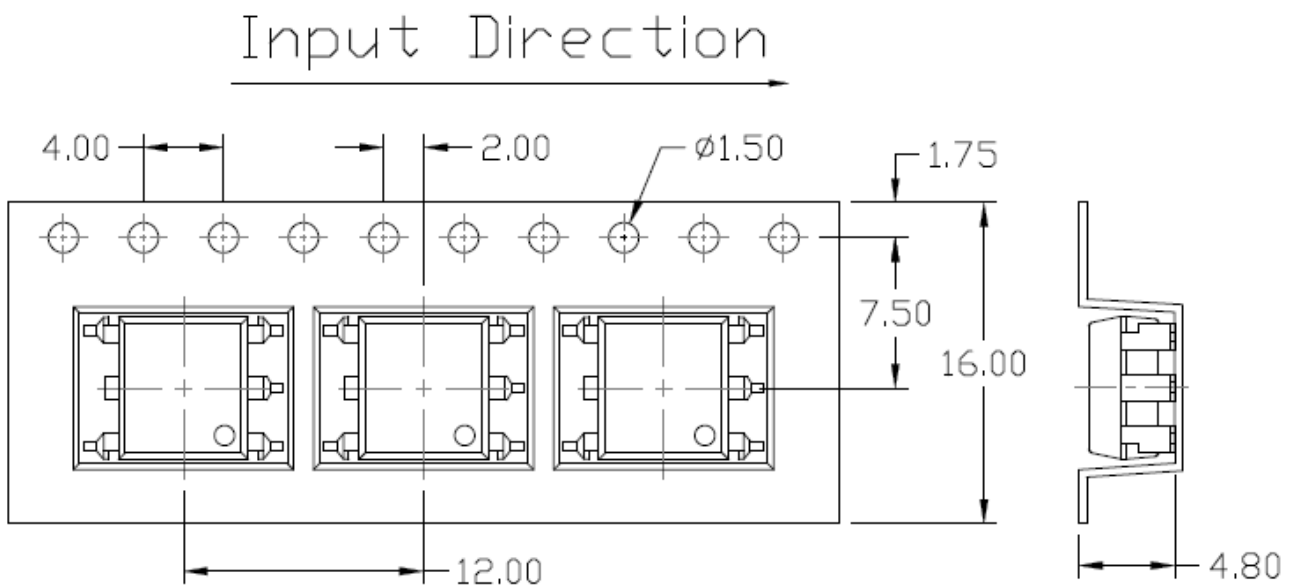
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## Carrier Tape Specifications *Dimensions in mm unless otherwise stated*

### Option S (T1) & SL (T1)



### Option S (T2) & SL (T2)





**Solderability spec (follow the JEDEC standard JESD22-B102)**

Reflow Soldering: Immersed surface, other than the end of pin as cut-surface, must be covered by solder.

Solder-Bath: More than 95% of the electrode must be covered with solder.

**Wave soldering (follow the JEDEC standard JESD22-A111)**

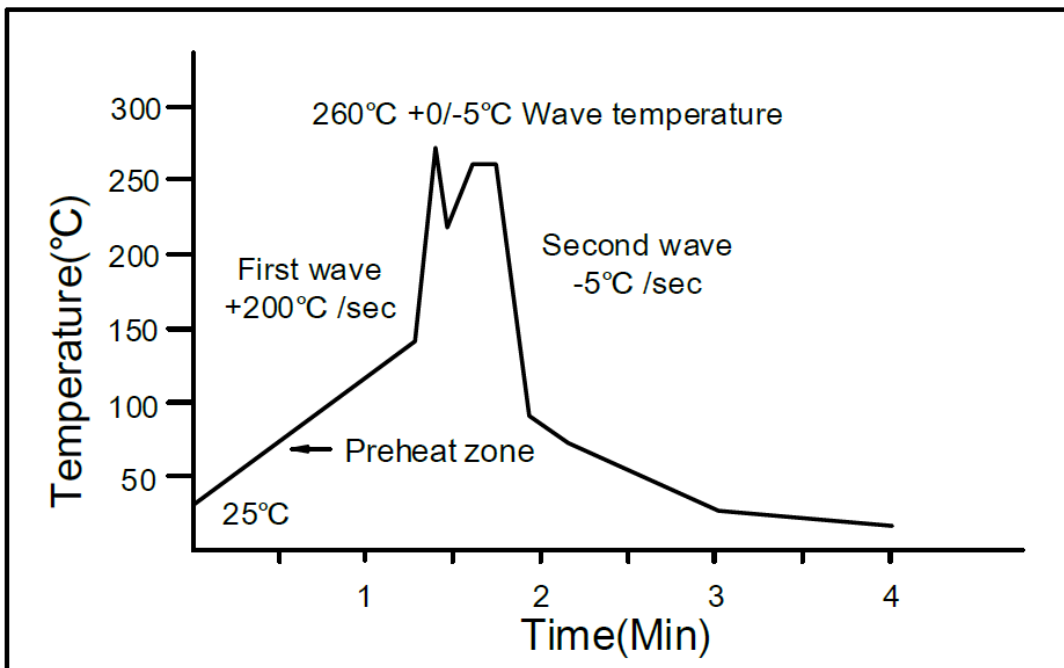
One time soldering is recommended within the condition of temperature.

Temperature: 260+0/-5°C.

Time: 10 sec.

Preheat temperature: 25 to 140°C.

Preheat time: 30 to 80 sec.



**Iron Soldering (follow the standard MIL-STD 202G, Method 210F)**

Allow single lead soldering in every single process.

One time soldering is recommended.

Temperature: 350±10°C

Time: 5 sec max.

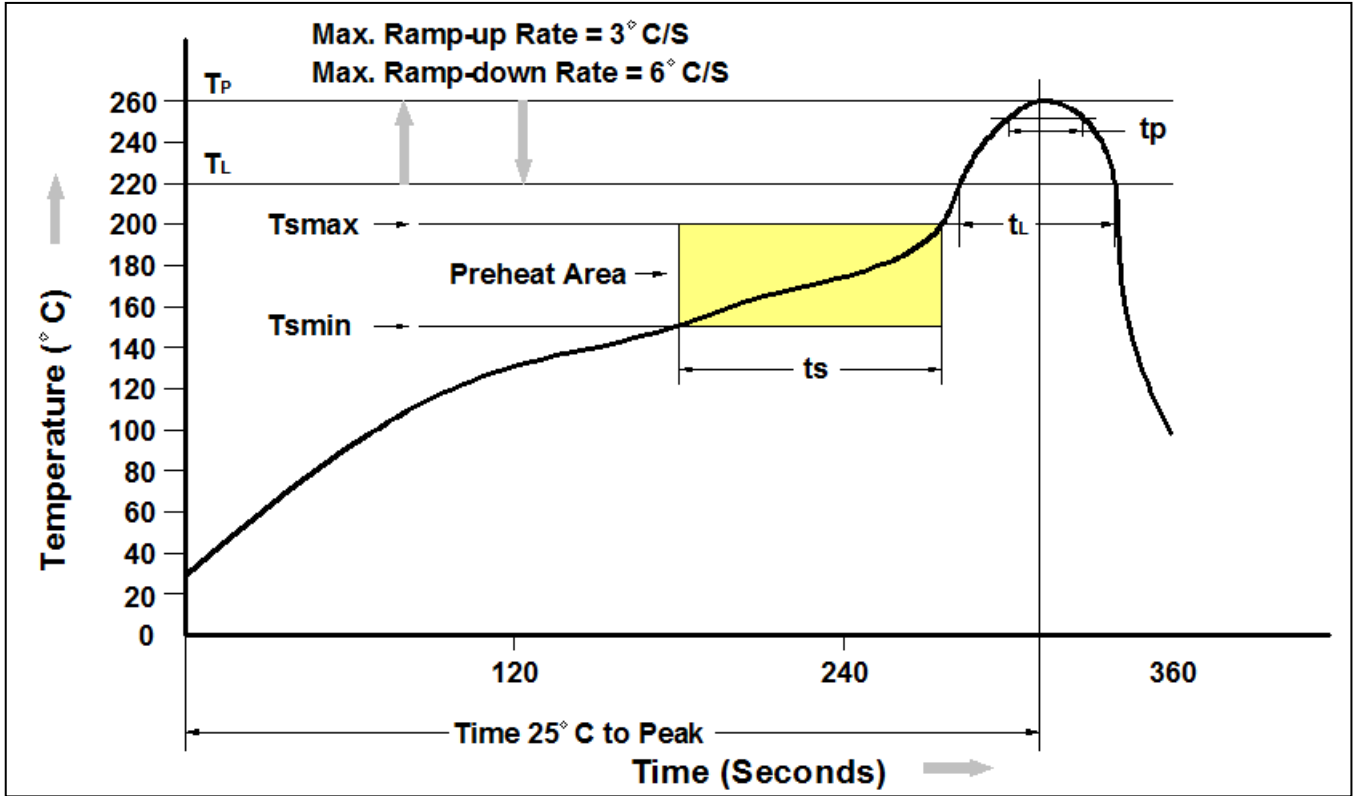


# CT3051-5L, CT3052-5L, CT3053-5L

## 600V Random Phase 5-Pin DMC-Isolator®

### Phototriac Optocoupler

#### Reflow Profile (follow the JEDEC standard J-STD-020)



| Profile Feature   | Pb-Free Assembly Profile |
|---|--------------------------|
| Temperature Min. (T <sub>min</sub> )                                | 150°C                    |
| Temperature Max. (T <sub>max</sub> )                                | 200°C                    |
| Time (t <sub>s</sub> ) from (T <sub>min</sub> to T <sub>max</sub> ) | 60-120 seconds           |
| Ramp-up Rate (t <sub>L</sub> to t <sub>P</sub> )                    | 3°C/second max.          |
| Liquidous Temperature (T <sub>L</sub> )                             | 217°C                    |
| Time (t <sub>L</sub> ) Maintained Above (T <sub>L</sub> )           | 60 – 150 seconds         |
| Peak Body Package Temperature                                       | 260°C +0°C / -5°C        |
| Time (t <sub>P</sub> ) within 5°C of 260°C                          | 30 seconds               |
| Ramp-down Rate (T <sub>P</sub> to T <sub>L</sub> )                  | 6°C/second max           |
| Time 25°C to Peak Temperature                                       | 8 minutes max.           |



**CT3051-5L, CT3052-5L, CT3053-5L**  
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**Phototriac Optocoupler**

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