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# CT354 Series

# AC Input 4-Pin Mini-Flat DMC-Isolator® Phototransistor Optocoupler

## Features

- High isolation 3750 VRMS
- Patented coplanar structure DMC-Isolator®
- Various CTR selection available
- AC input with transistor output
- Operating Temperature range - 55 °C to 110 °C
- External Creepage ≥ 5.0mm
- Distance Through Isolation ≥ 0.4mm
- Clearance Distance ≥ 5.0mm
- RoHS and REACH Compliance
- Halogen Free Compliance
- MSL class 1
- Regulatory Approvals
  - ✓ UL - UL1577 (E364000)
  - ✓ VDE - EN60747-5-5 (VDE0884-5)
  - ✓ CQC - GB4943.1, GB8898 (19001231775)
  - ✓ IEC62368 (FI/41119)

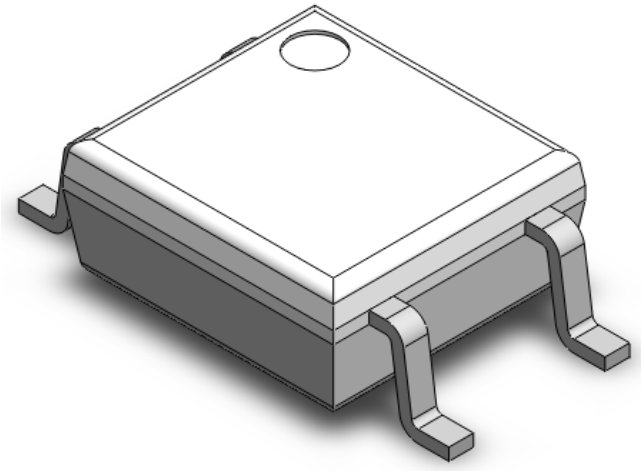
## Description

The CT354 series of AC input optocoupler consists of a photo transistor optically coupled to two Infrared-emitting diodes in a 4-lead Mini-Flat DMC-Isolator® package with bending option.

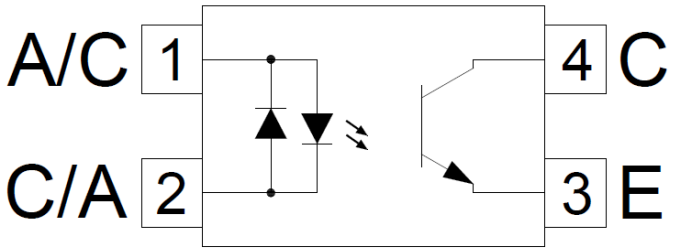
## Applications

- Switch mode power supplies
- Computer peripheral interface
- Microprocessor system interface

## Package Outline



## Schematic



## Absolute Maximum Ratings $T_A$ = 25°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 |
|---|---|---|---|---|
| $V_{ISO}$ | Isolation voltage (AC, 1 minute, 40 ~ 60% R.H.) | 3750 | $V_{RMS}$ | |
| $T_{OPR}$ | Operating temperature | -55 ~ +110 | $^0C$ | |
| $T_{STG}$ | Storage temperature | -55 ~ +150 | $^0C$ | |
| $T_{SOL}$ | Soldering temperature (For 10 seconds) | 260 | $^0C$ | |
| $P_{TOT}$ | Total power dissipation | 200 | mW | |
| **Emitter** | | | | |
| $I_F$ | Forward current | ±50 | mA | |
| $I_{F(TRANS)}$ | Peak transient current (≤1μs P.W,300pps) | 1 | A | |
| $P_D$ | Power dissipation | 70 | mW | |
| **Detector** | | | | |
| $P_C$ | Power dissipation | 150 | mW | |
| $B_{VCEO}$ | Collector-Emitter Breakdown Voltage | 80 | V | |
| $B_{VECO}$ | Emitter-Collector Breakdown Voltage | 7 | V | |
| $I_C$ | Collector Current | 50 | mA | |

## Electrical Characteristics $T_A$ = 25°C, unless otherwise specified

### Emitter Characteristics

| Symbol | Parameters | Test Conditions | Min | Typ | Max | Units | Notes |
|---|---|---|---|---|---|---|---|
| $V_F$ | Forward voltage | $I_F$= ±10mA | | 1.24 | 1.4 | V | |
| $C_{IN}$ | Input Capacitance | f= 1kHz | - | 45 | - | pF | |

### Detector Characteristics

| Symbol | Parameters | Test Conditions | Min | Typ | Max | Units | Notes |
|---|---|---|---|---|---|---|---|
| $B_{VCEO}$ | Collector-Emitter Breakdown | $I_C$= 100μA | 80 | - | - | V | |
| $B_{VECO}$ | Emitter-Collector Breakdown | $I_E$= 100μA | 7 | - | - | V | |
| $I_{CEO}$ | Collector-Emitter Dark Current | $V_{CE}$= 20V, $I_F$=0mA | - | - | 100 | nA | |

### Transfer Characteristics

| Symbol | Parameters | | Test Conditions | Min | Typ | Max | Units | Notes |
|---|---|---|---|---|---|---|---|---|
| CTR | Current Transfer Ratio | CT354 | $I_F$= ±1mA, $V_{CE}$= 5V | 20 | - | 300 | % | |
| | | CT354A | | 50 | - | 150 | | |
| | | CT354B | | 100 | | 300 | | |
| | CTR Symmetry | | $I_F$= ±1mA, $V_{CE}$= 5V | 0.7 | - | 1.3 | | |
| $V_{CE(SAT)}$ | Collector-Emitter Saturation Voltage | | $I_F$= ±20mA, $I_C$= 1mA | - | 0.1 | 0.2 | V | |
| $R_{IO}$ | Isolation Resistance | | $V_{IO}$= 500$V_{DC}$ | $5x10^{10}$ | - | - | Ω | |
| $C_{IO}$ | Isolation Capacitance | | f= 1MHz | - | 0.6 | 1.0 | pF | |

### Switching Characteristics

| Symbol | Parameters | Test Conditions | Min | Typ | Max | Units | Notes |
|---|---|---|---|---|---|---|---|
| $t_r$ | Rise Time | $I_C$= 2mA, $V_{CE}$= 2V, $R_L$= 100Ω | - | 6 | 18 | μs | |
| $t_f$ | Fall Time | | - | 8 | 18 | | |

## Typical Characteristic Curves *$T_A$ = 25°C, unless otherwise specified*

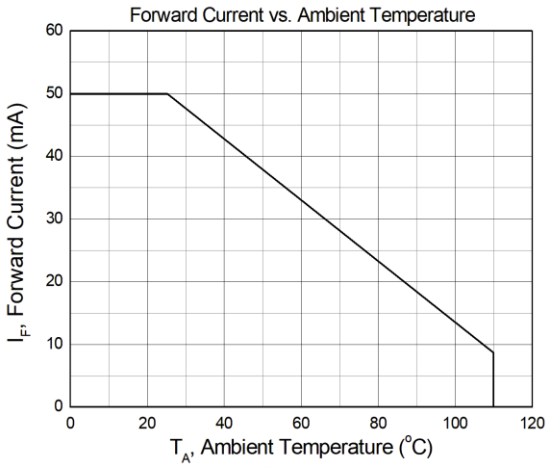



**Figure 1**

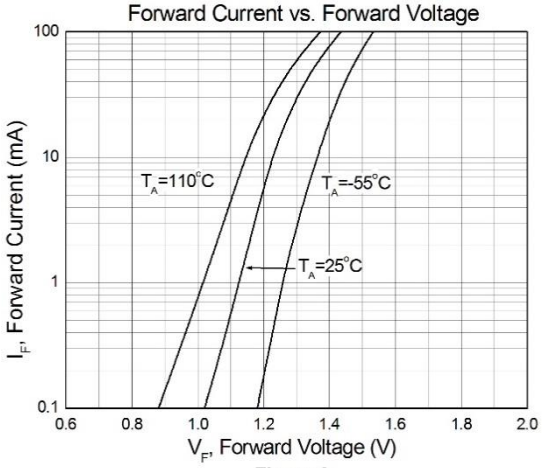



**Figure 2**

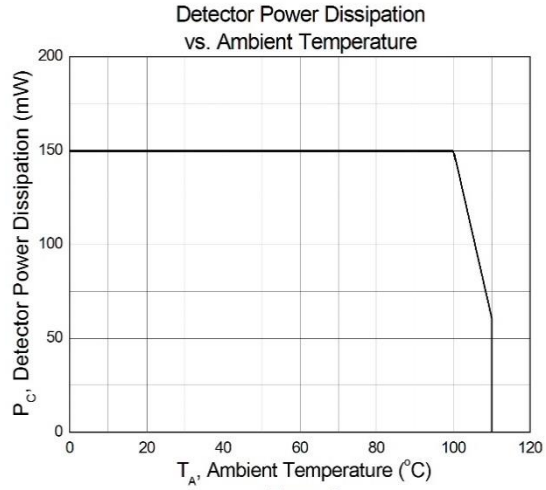



**Figure 3**

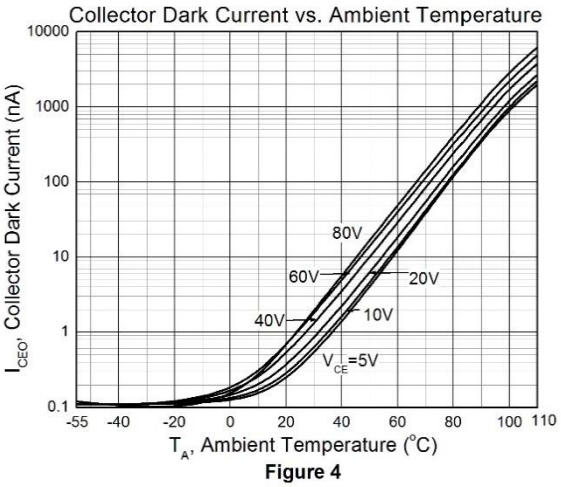



**Figure 4**

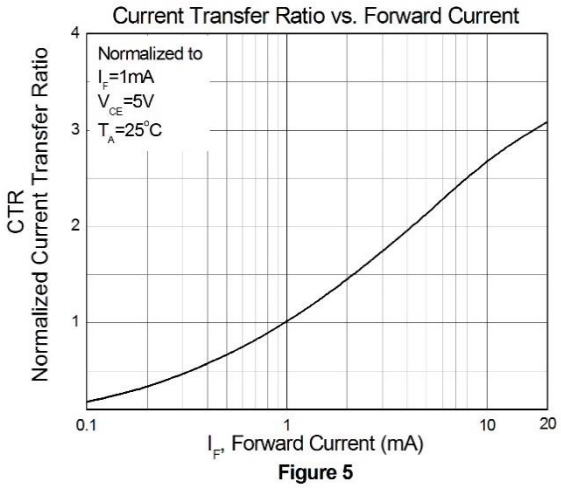



**Figure 5**

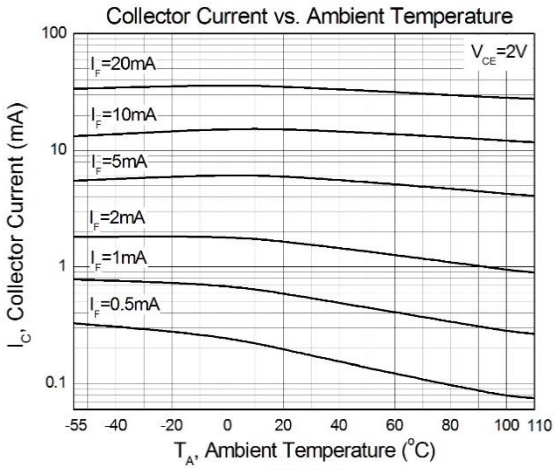



**Figure 6**

## Typical Characteristic Curves *$T_A$ = 25°C, unless otherwise specified (Continued)*

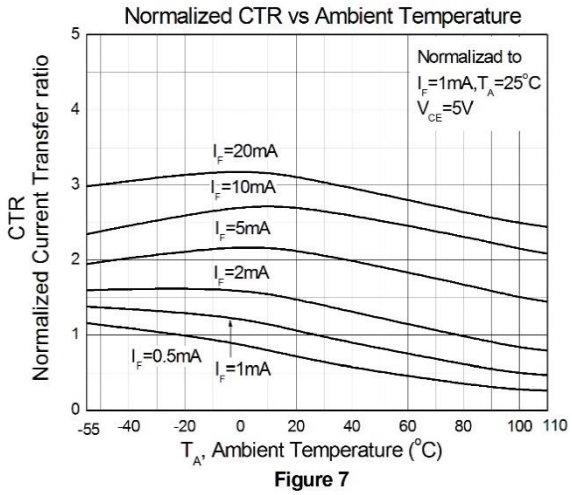



**Figure 7**

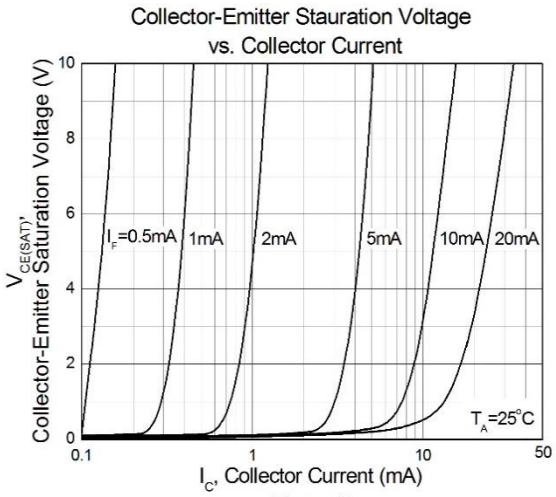



**Figure 8**

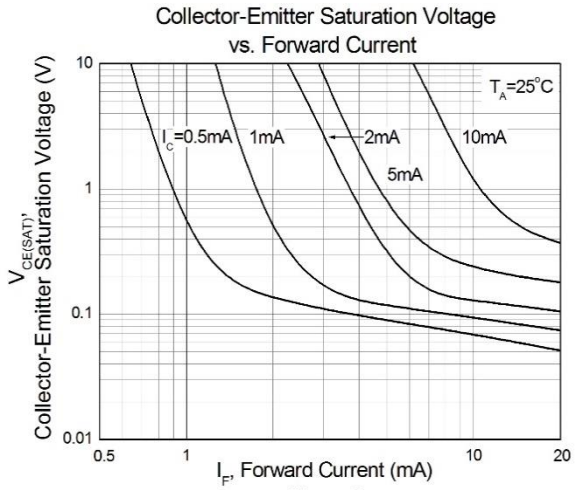



**Figure 9**

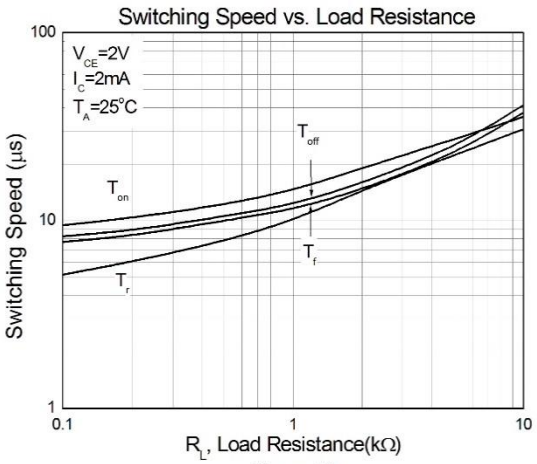



**Figure 10**

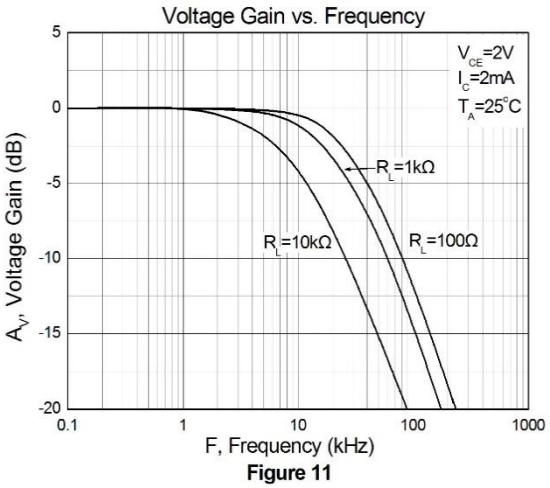



**Figure 11**

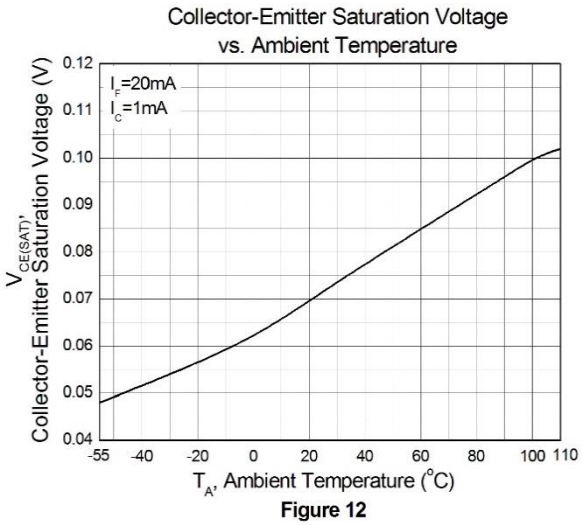



**Figure 12**

## Test Circuit

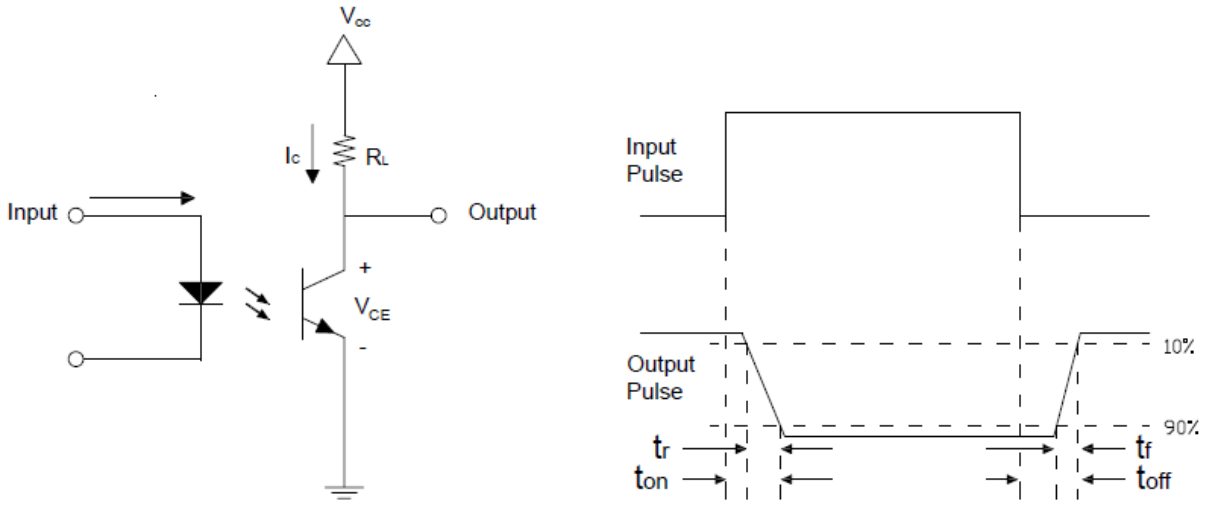
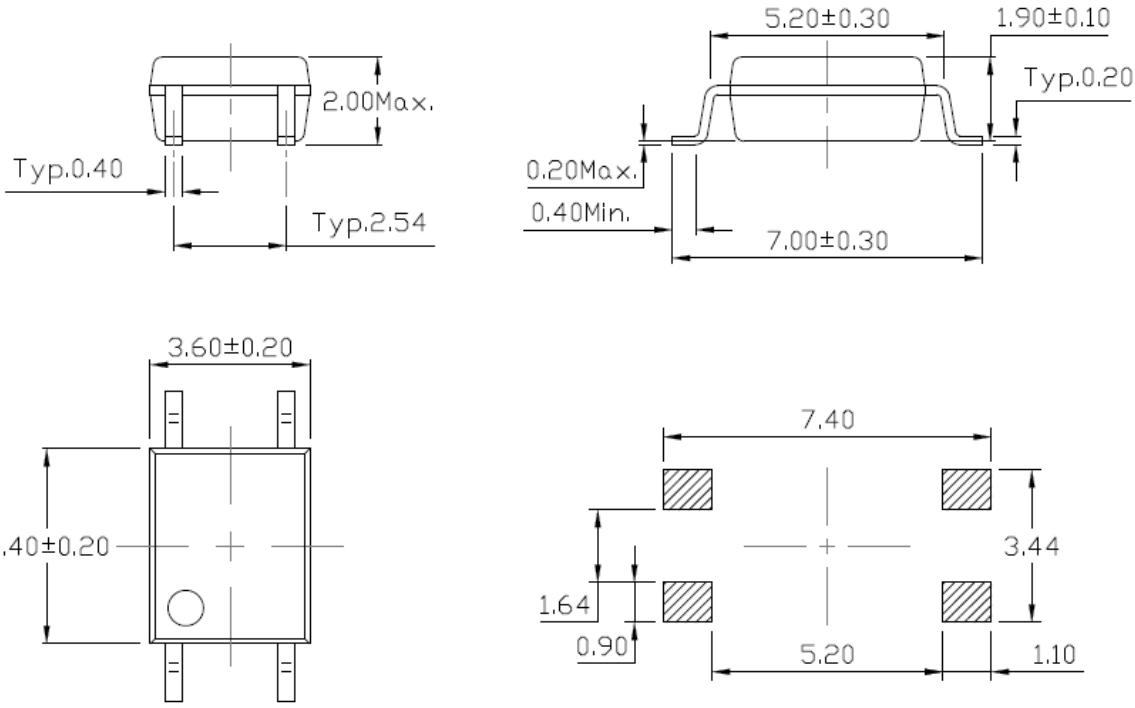
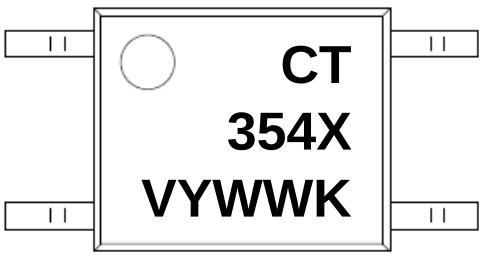



**Figure 13: Switching Time Test Circuit**

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




## Marking Information




**Note:**

| | |
|---|---|
| CT | : Denotes “CT Micro” |
| 354 | : Part Number |
| X | : CTR Rank Option |
| V | : VDE Safety Mark Option (Blank or V) |
| Y | : One Digit Year Code |
| WW | : Two Digit Work Week |
| K | : Manufacturing Code |

## Ordering Information

CT354X (V)(Z)

CT = Denotes “CT Micro”

354 = Part Number

X = CTR Rank Option (Blank, A or B)

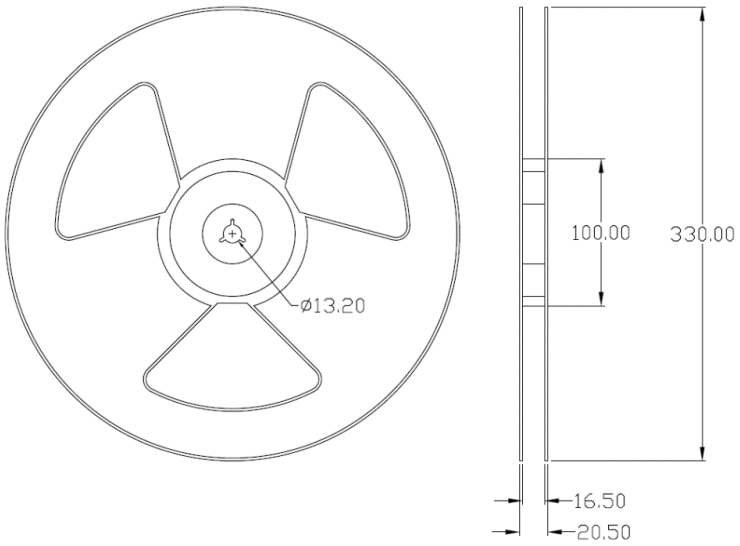
V = VDE Safety Mark Option (Blank or V)

Z = Tape and Reel Option (T1 or T2)

| *Option* | *Description* | *Quantity* |
|---|---|---|
| T1 | Surface Mount Lead Forming – With Option 1 Taping | 3000 Units/Reel |
| T2 | Surface Mount Lead Forming – With Option 2 Taping | 3000 Units/Reel |

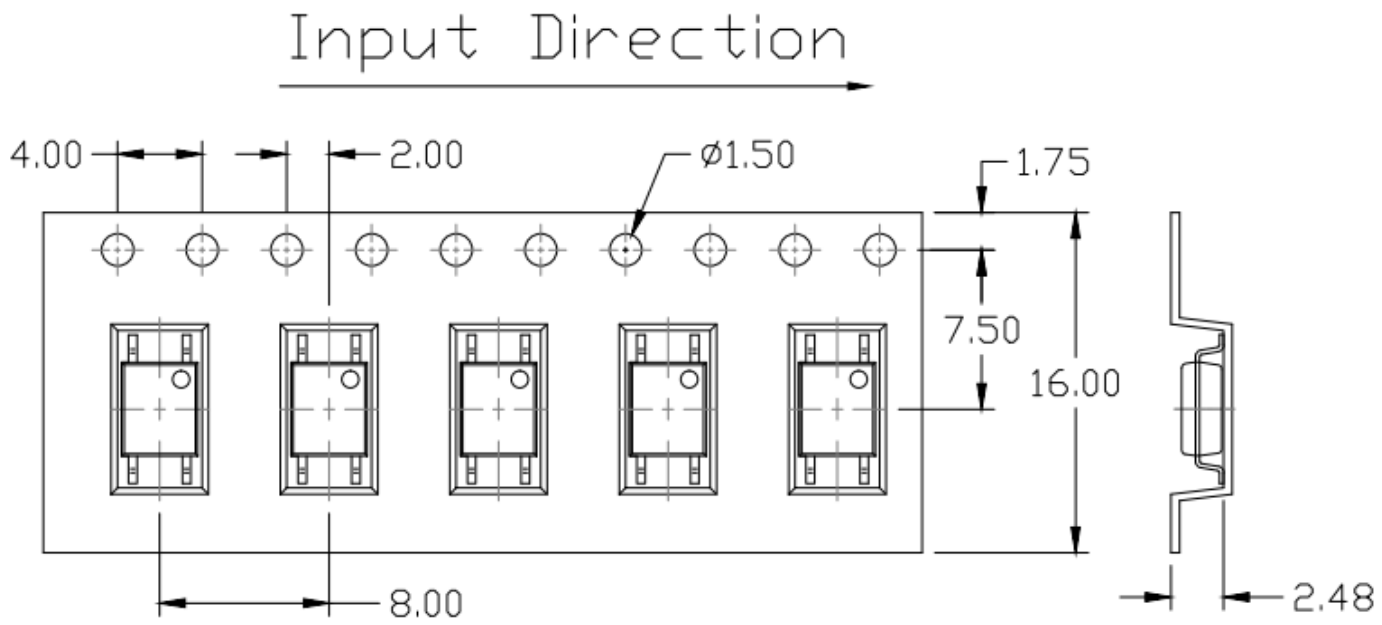
## Reel Dimension *All dimensions are in mm, unless otherwise stated*

### Option T1/T2

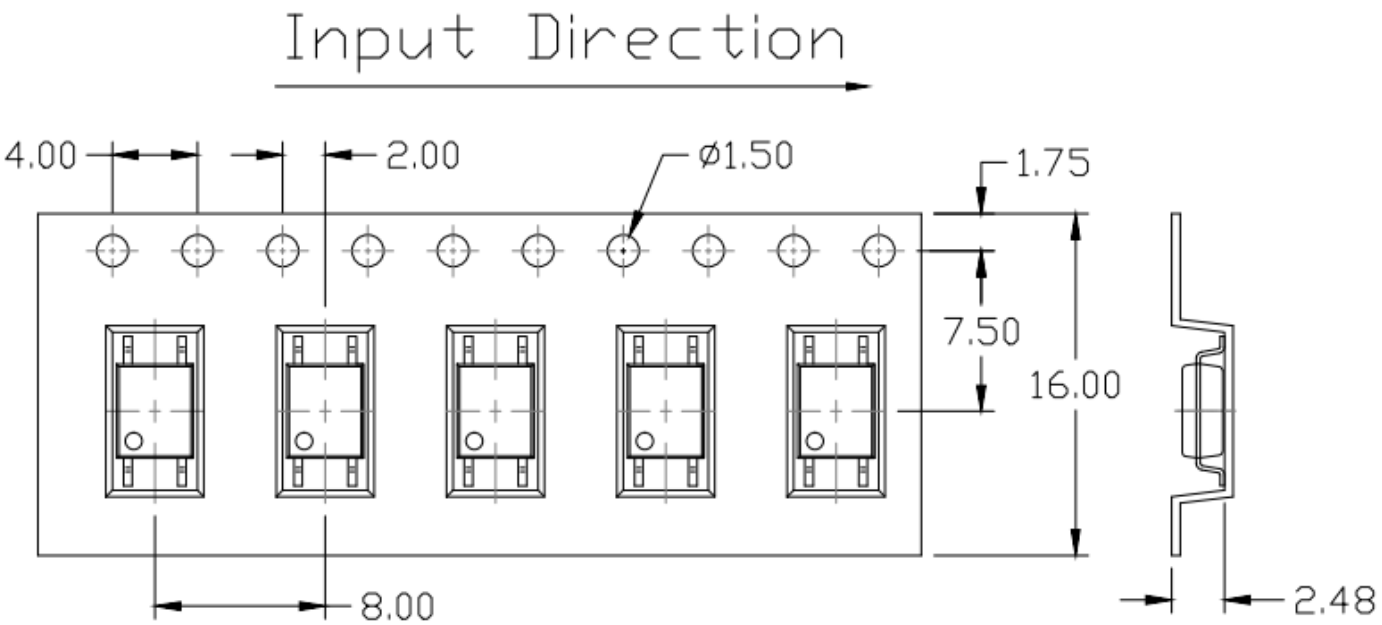


## Carrier Tape Specifications *Dimensions in mm unless otherwise stated*

### Option (T1)




### Option (T2)



## Solderability Specification (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)

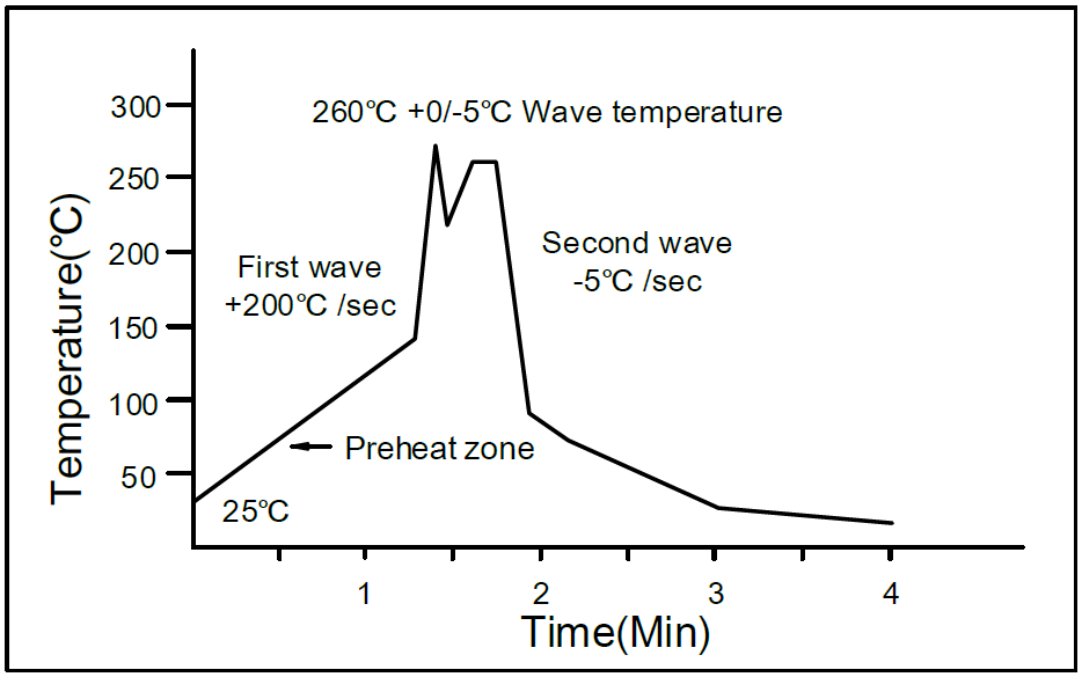
One time soldering is recommended within the condition of temperature.

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)

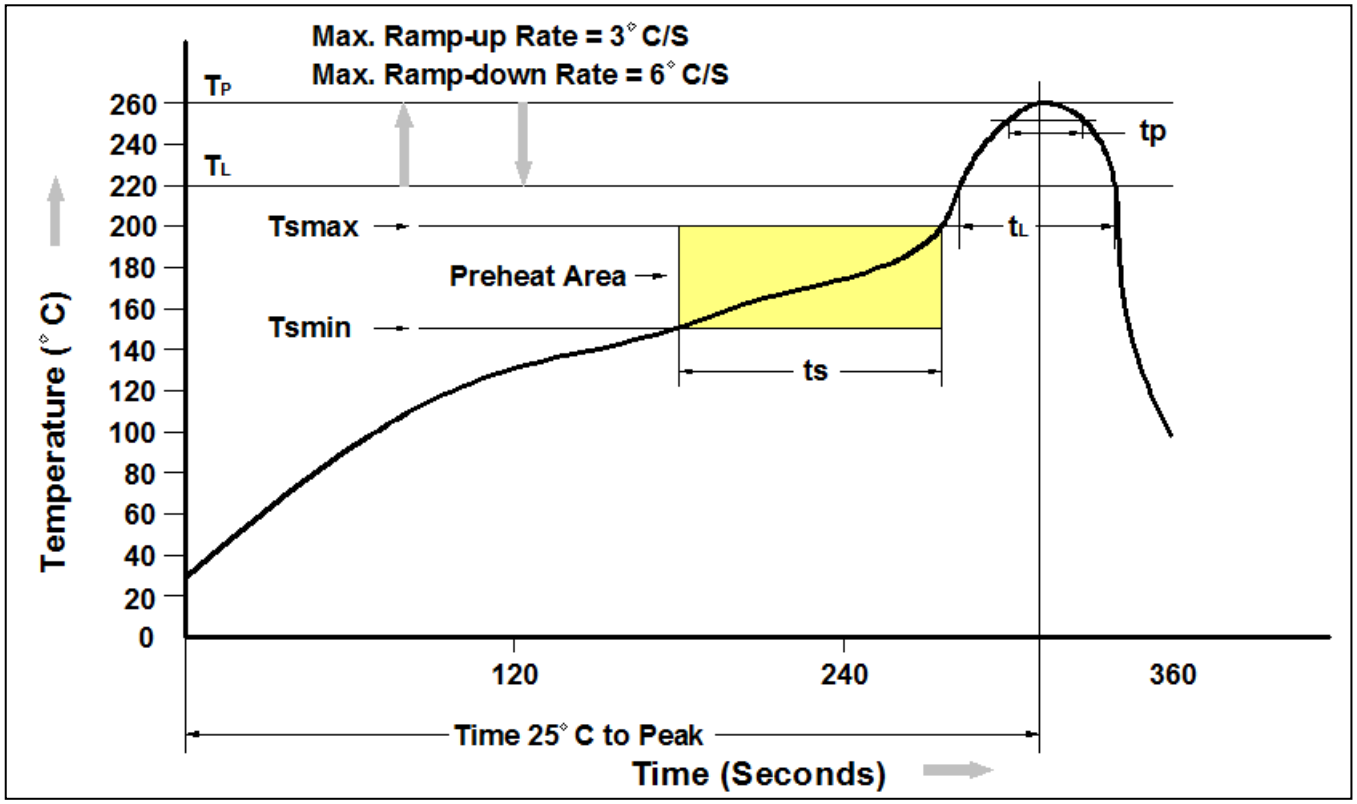
Allow single lead soldering in every single process.

One time soldering is recommended.

Temperature: 350±10˚C

Time: 5 sec max.

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




| Profile Feature | Pb-Free Assembly Profile |
|---|---|
| Temperature Min. (Tsmin) | 150°C |
| Temperature Max. (Tsmax) | 200°C |
| Time (ts) from (Tsmin to Tsmax) | 60-120 seconds |
| Ramp-up Rate ($t_L$ to $t_P$) | 3°C/second max. |
| Liquidous Temperature ($T_L$) | 217°C |
| Time ($t_L$) Maintained Above ($T_L$) | 60 – 150 seconds |
| Peak Body Package Temperature | 260°C +0°C / -5°C |
| Time ($t_P$) within 5°C of 260°C | 30 seconds |
| Ramp-down Rate ($T_P$ to $T_L$) | 6°C/second max |
| Time 25°C to Peak Temperature | 8 minutes max. |

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