# CT814 Series

# AC Input 4-Pin Phototransistor Optocoupler

## Features

- High isolation 5000 VRMS
- CTR flexibility available see order information
- DC input with transistor output
- External Creepage ≥ 7.5mm (S/SL Type)
- External Creepage ≥ 8.0mm (SLM Type)
- Operating Temperature range - 55 ℃ to 110 ℃
- Regulatory Approvals
  - UL - UL1577 (E364000)
  - VDE - EN60747-5-5(VDE0884-5)
  - CQC – GB4943.1, GB8898
  - IEC60065, IEC60950

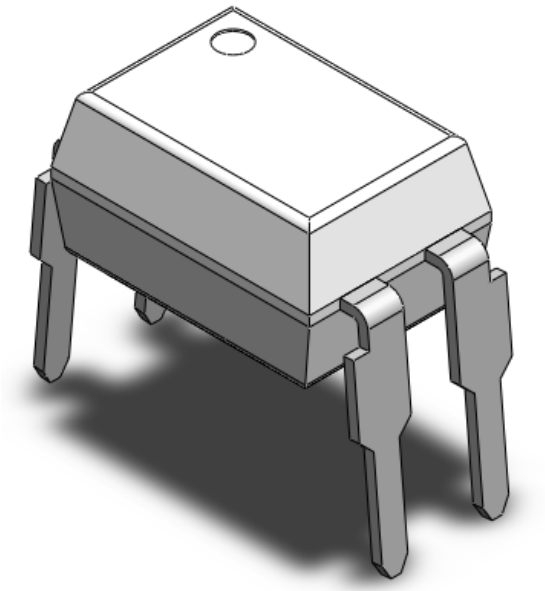
## Description

The CT814 series consists of a phototransistor optically coupled to two gallium arsenide Infrared-emitting diode, connected in inverse parallel, in a 4-lead DIP package with bending options.

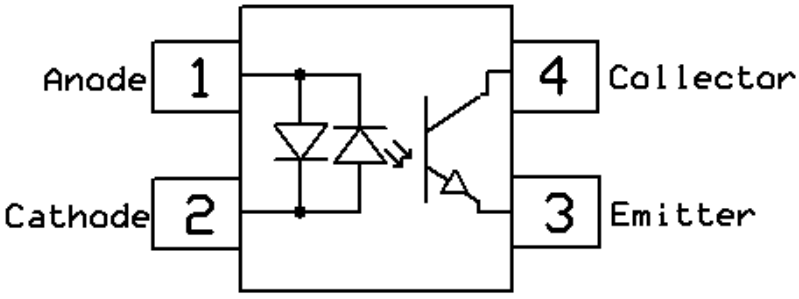
## Applications

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

## Package Outline



## Schematic



## Absolute Maximum Rating at 25°C

| *Symbol* | *Parameters* | *Ratings* | *Units* | *Notes* |
|---|---|---|---|---|
| $V_{ISO}$ | Isolation voltage | 5000 | $V_{RMS}$ | |
| $P_{TOT}$ | Total power dissipation | 200 | mW | |
| $T_{OPR}$ | Operating temperature | -55 ~ +110 | °C | |
| $T_{STG}$ | Storage temperature | -55 ~ +150 | °C | |
| $T_{SOL}$ | Soldering temperature | 260 | °C | |
| **Emitter** | | | | |
| $I_F$ | Forward current | ±60 | mA | |
| $I_{F(TRANS)}$ | Peak transient current (≤1μs P.W,300pps) | 1 | A | |
| $P_D$ | Emitter power dissipation | 100 | mW | |
| **Detector** | | | | |
| $P_D$ | Detector power dissipation | 150 | mW | |
| $B_{VCEO}$ | Collector-Emitter Breakdown Voltage | 80 | V | |
| $B_{VECO}$ | Emitter-Collector Breakdown Voltage | 6 | V | |
| $I_C$ | Collector Current | 50 | mA | |

## Electrical Characteristics $T_A$ = 25℃ (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= 1MHz | - | 30 | - | 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 | 6 | - | - | 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 | CT814 | $I_F$= ±1mA, $V_{CE}$= 5V | 20 | - | 300 | % | |
| | | CT814A | | 50 | - | 150 | | |
| | | CT814B | | 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 | - | 0.04 | 0.2 | V | |
| $R_{IO}$ | Isolation Resistance | | $V_{IO}$= 500$V_{DC}$ | $5x10^{10}$ | - | - | Ω | |
| $C_{IO}$ | Isolation Capacitance | | f= 1MHz | - | 0.5 | 1 | pF | |

### Switching Characteristics

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

## Typical Characteristic Curves

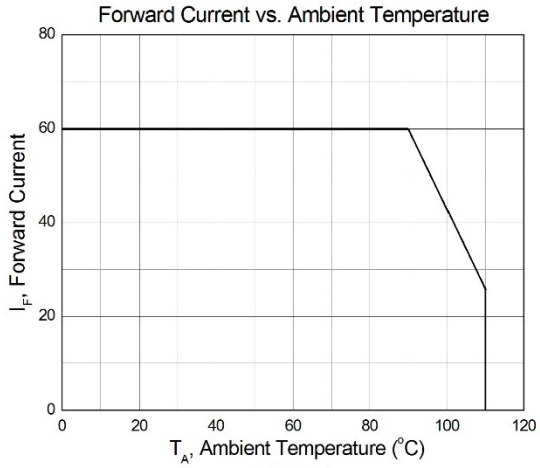



**Figure 1**

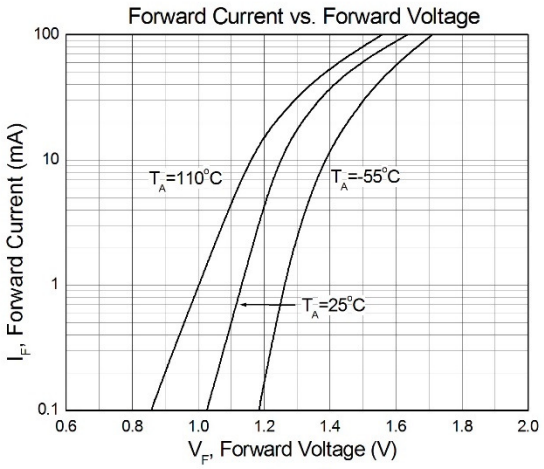



**Figure 2**

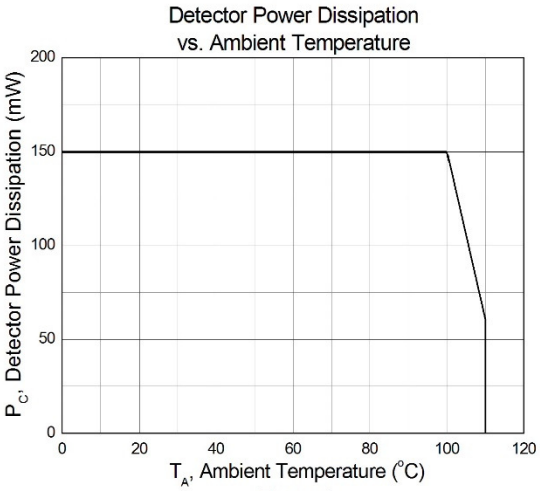



**Figure 3**

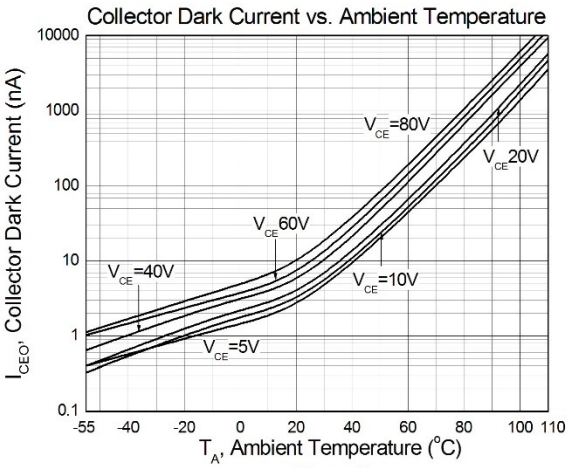



**Figure 4**

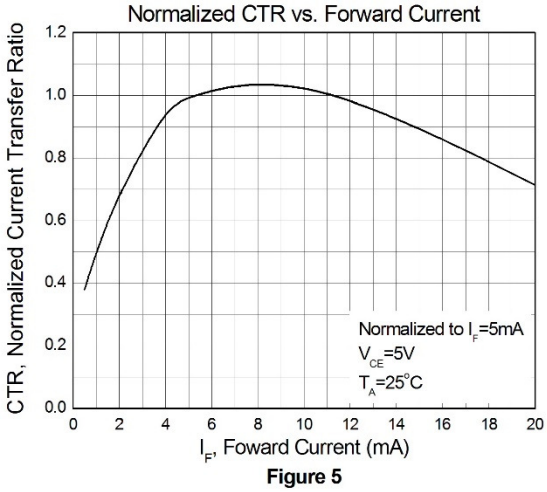



**Figure 5**

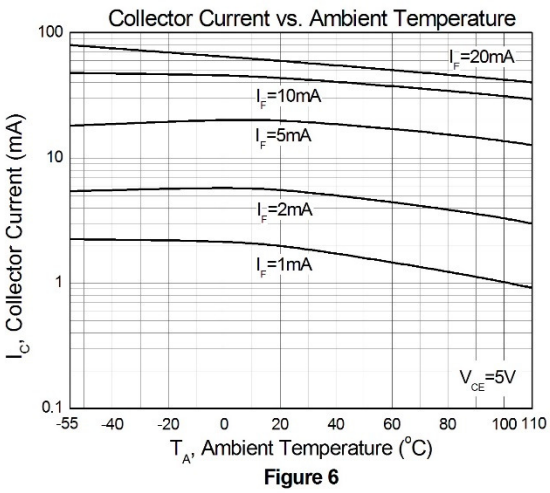



**Figure 6**

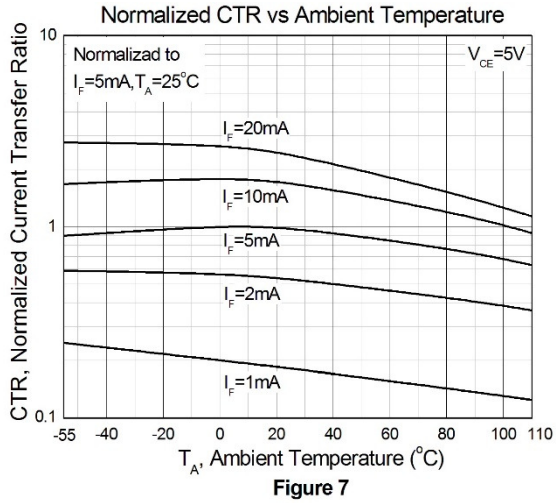



Figure 7

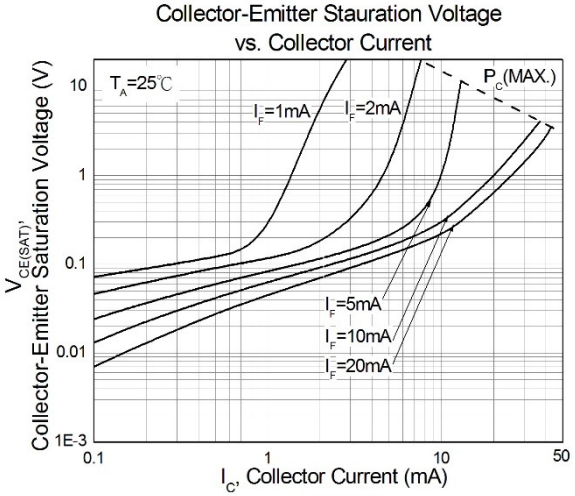



Figure 8

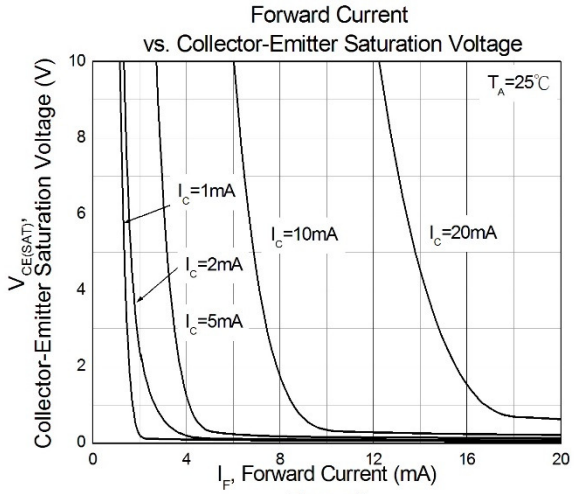



Figure 9

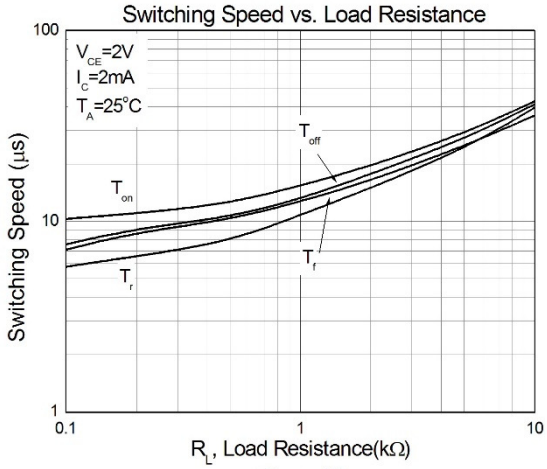



Figure 10

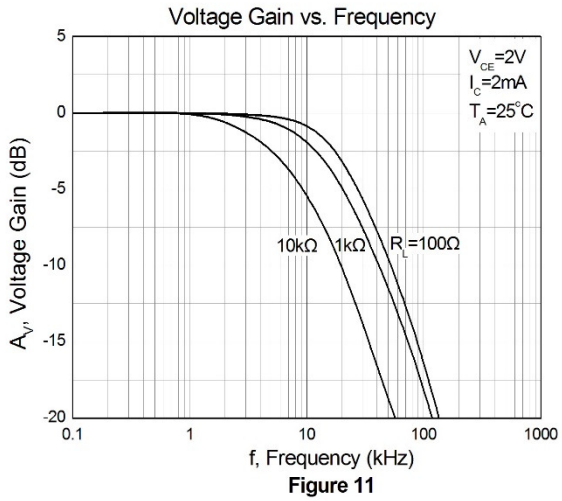
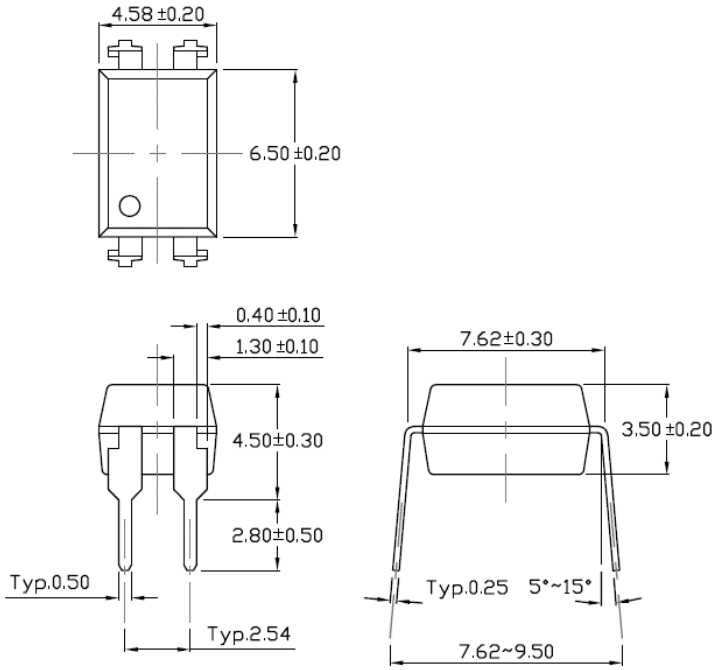


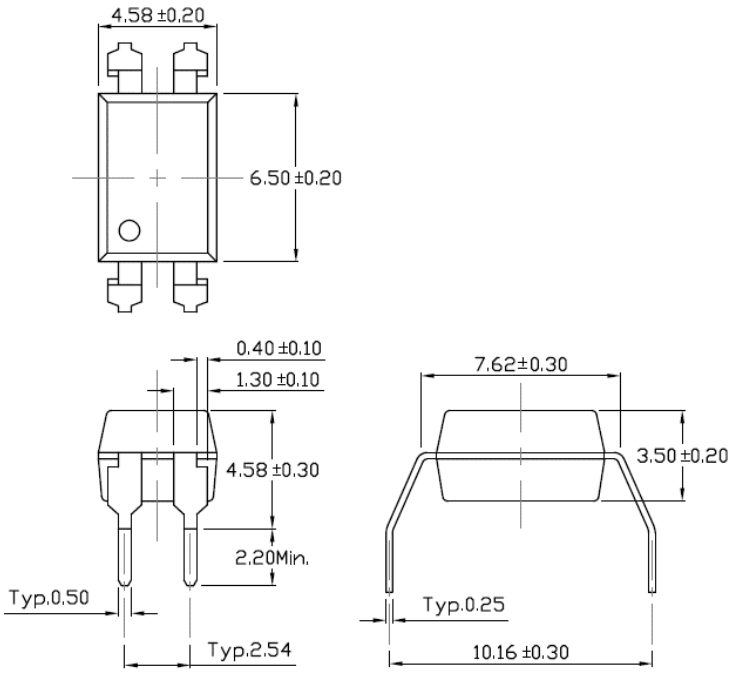

Figure 11

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

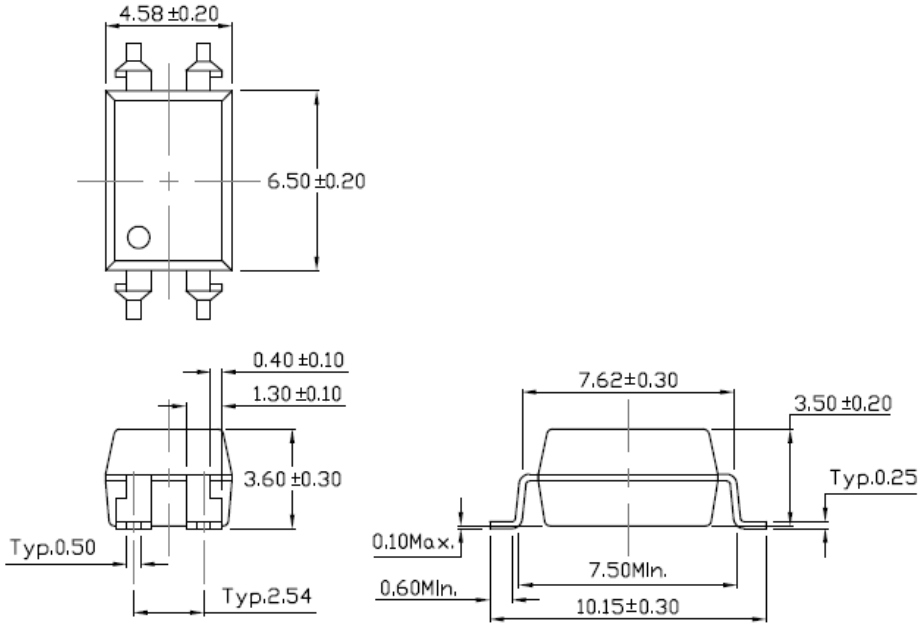
### Standard DIP – Through Hole



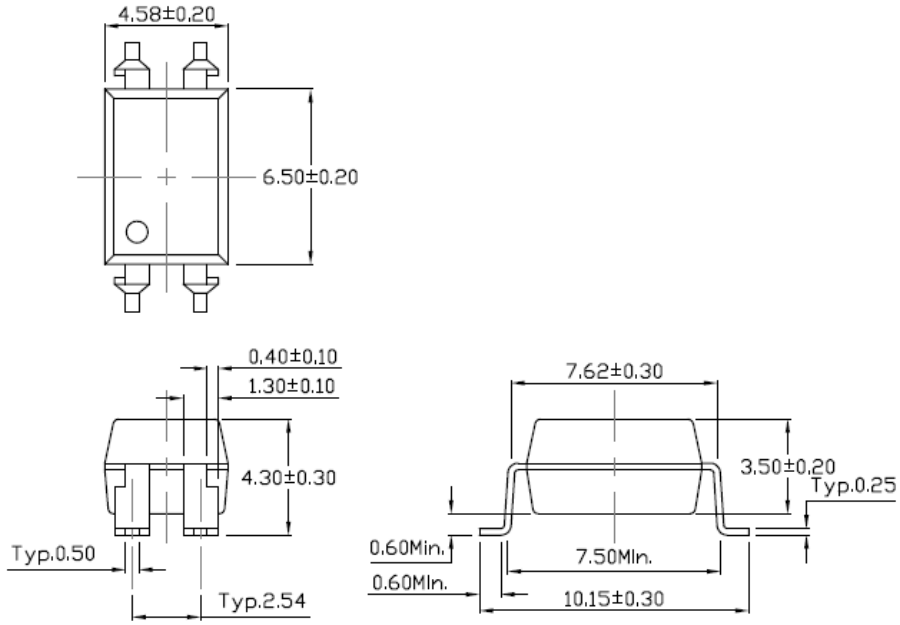

### Gullwing (400mil) Lead Forming – Through Hole (M Type)



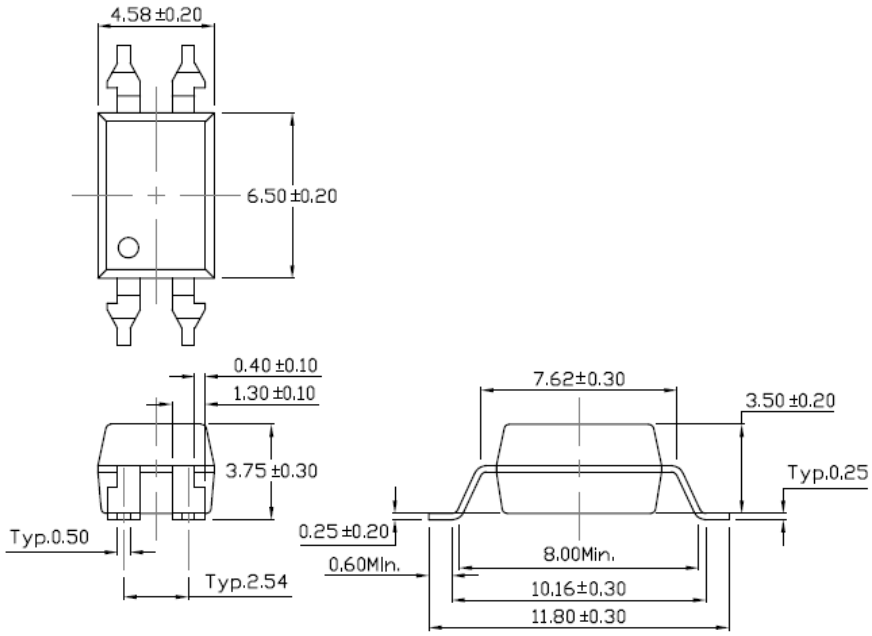
## Surface Mount Lead Forming (S Type)




## Surface Mount (Low Profile) Lead Forming (SL Type)

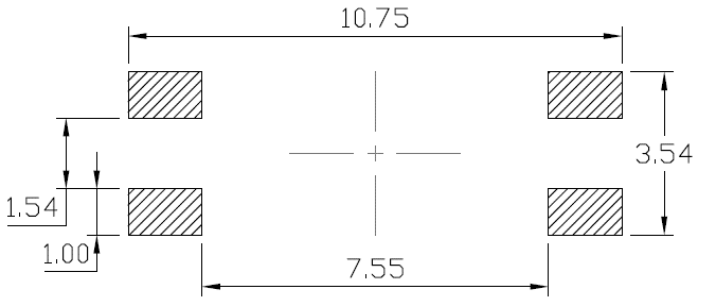


## Surface Mount (Gullwing) Lead Forming (SLM Type)

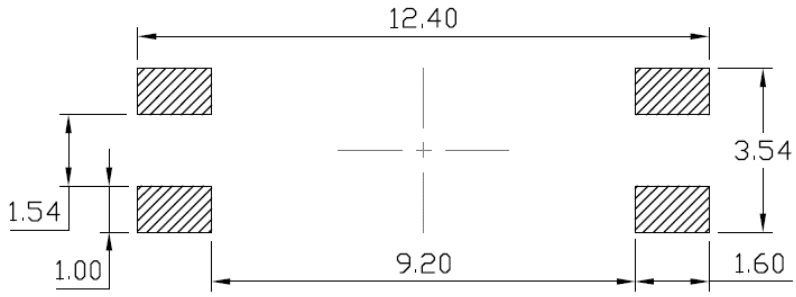


## Recommended Solder Mask *Dimensions in mm unless otherwise stated*

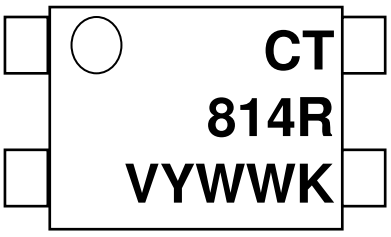
### Surface Mount Lead Forming & Surface Mount (Low Profile) Lead Forming




### Surface Mount (Gullwing) Lead Forming




## Marking Information




**Note:**

CT : Denotes “CT Micro”
814 : Part Number
R : CTR Rank
V : VDE Option
Y : Fiscal Year
WW : Work Week
K : Manufacturing Code

## Ordering Information

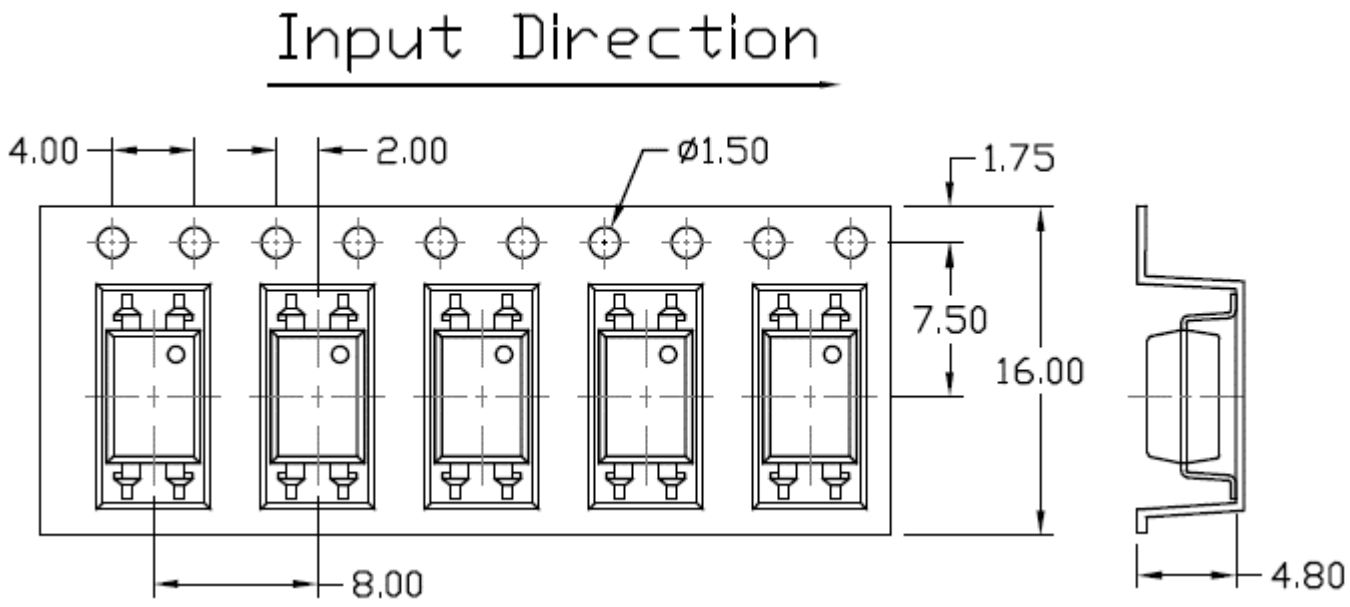
CT814X(V)(Y)(Z)-G

X = Part No. (X=A, B or None)
V = VDE Option ( V or None)
Y = Lead form option (S, SL, M, SLM or none)
Z = Tape and reel option (T1, T2, T3, T4 or none)
G= Material option (G: Green, None: Non-green)

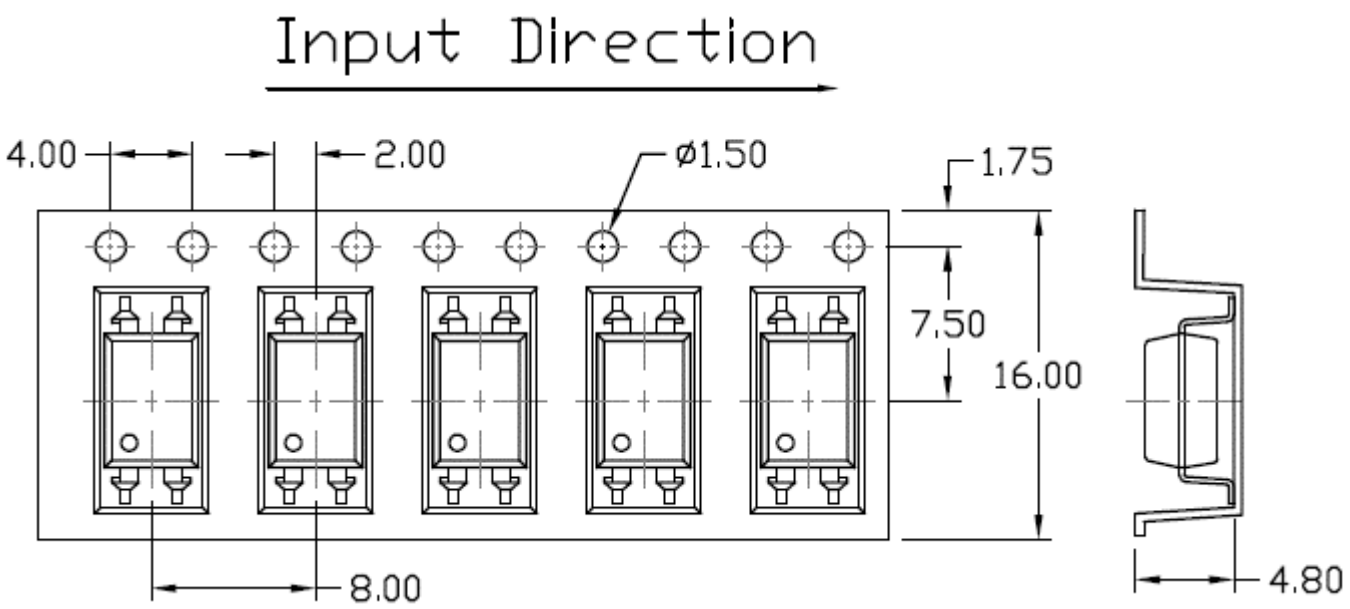
| ***Option*** | ***Description*** | ***Quantity*** |
|---|---|---|
| None | Standard 4 Pin DIP | 100 Units/Tube |
| M | Gullwing (400mil) Lead Forming | 100 Units/Tube |
| S(T1) | Surface Mount Lead Forming – With Option 1 Taping | 1500 Units/Reel |
| S(T2) | Surface Mount Lead Forming – With Option 2 Taping | 1500 Units/Reel |
| S(T3) | Surface Mount Lead Forming – With Option 3 Taping | 1000 Units/Reel |
| S(T4) | Surface Mount Lead Forming – With Option 4 Taping | 1000 Units/Reel |
| SL(T1) | Surface Mount (Low Profile) Lead Forming– With Option 1 Taping | 1500 Units/Reel |
| SL(T2) | Surface Mount (Low Profile) Lead Forming – With Option 2 Taping | 1500 Units/Reel |
| SL(T3) | Surface Mount (Low Profile) Lead Forming– With Option 3 Taping | 1000 Units/Reel |
| SL(T4) | Surface Mount (Low Profile) Lead Forming – With Option 4 Taping | 1000 Units/Reel |
| SLM(T1) | Surface Mount (Gullwing) Lead Forming– With Option 1 Taping | 1500 Units/Reel |
| SLM(T2) | Surface Mount (Gullwing) Lead Forming – With Option 2 Taping | 1500 Units/Reel |

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

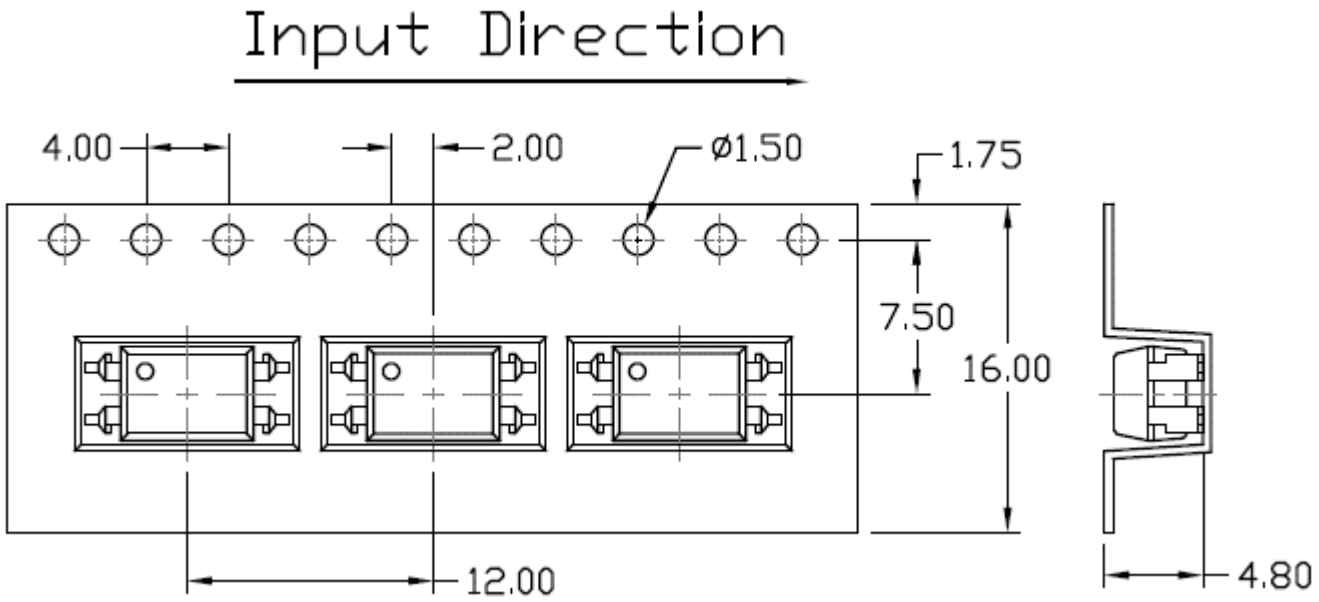
### Option S(T1) & SL(T1)



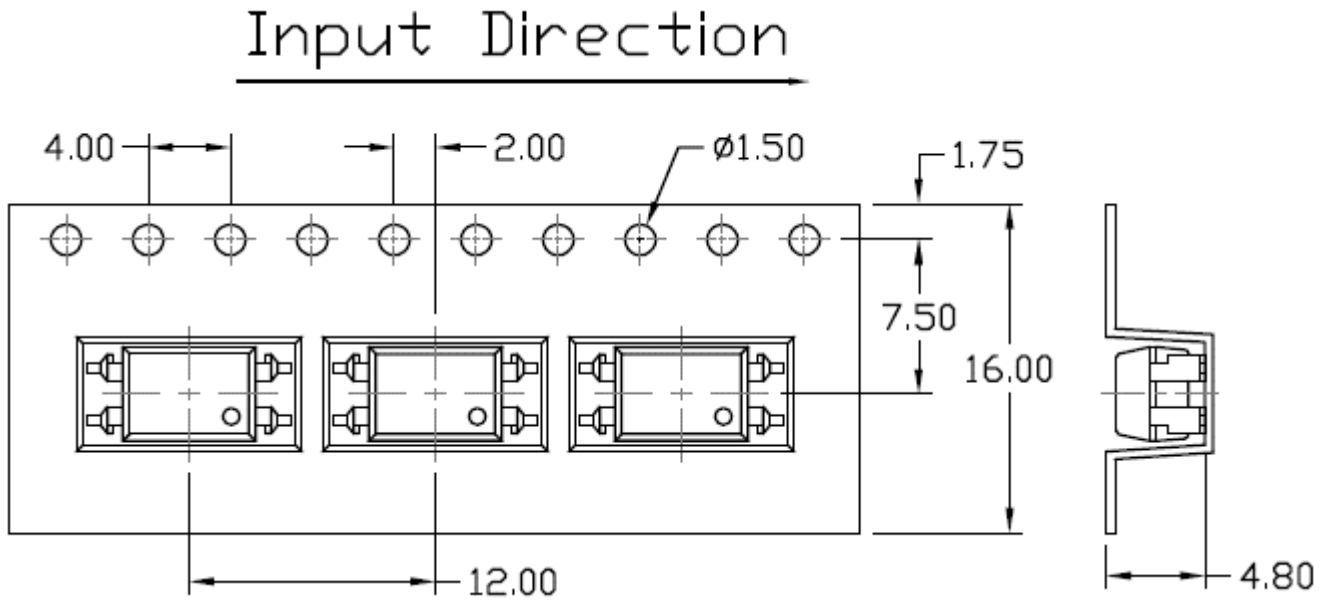

### Option S(T2) & SL(T2)



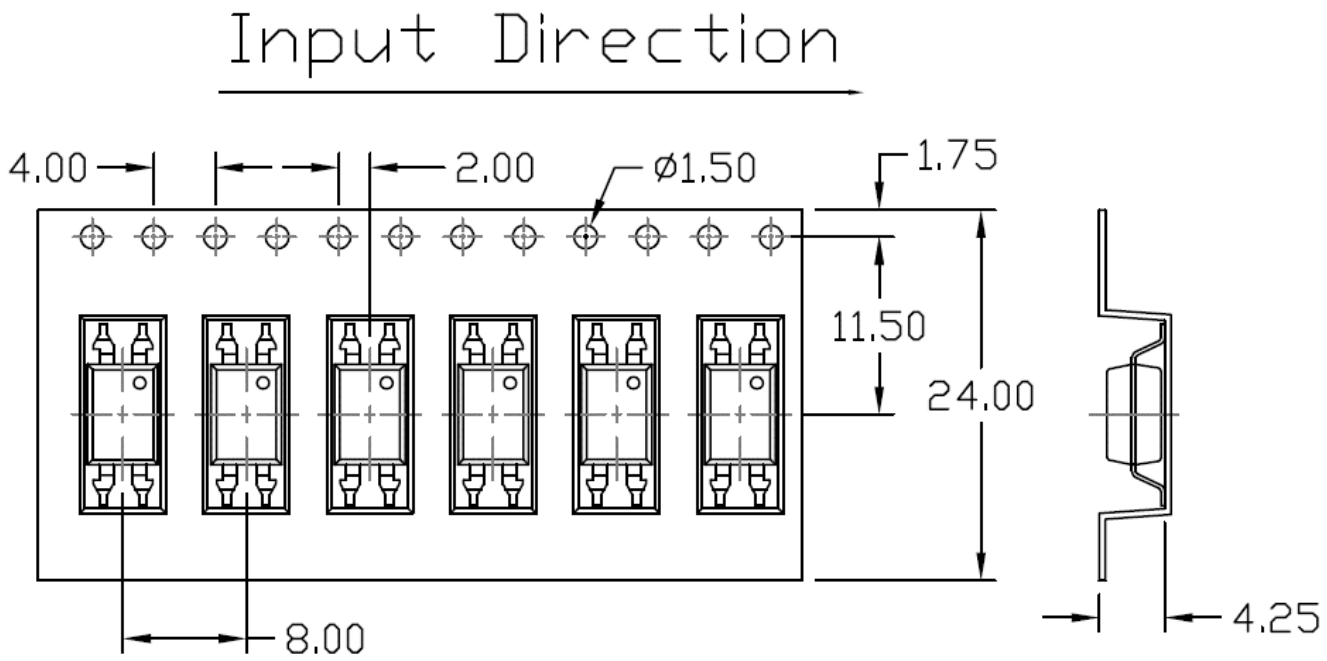
**Option S(T3) & SL(T3)**



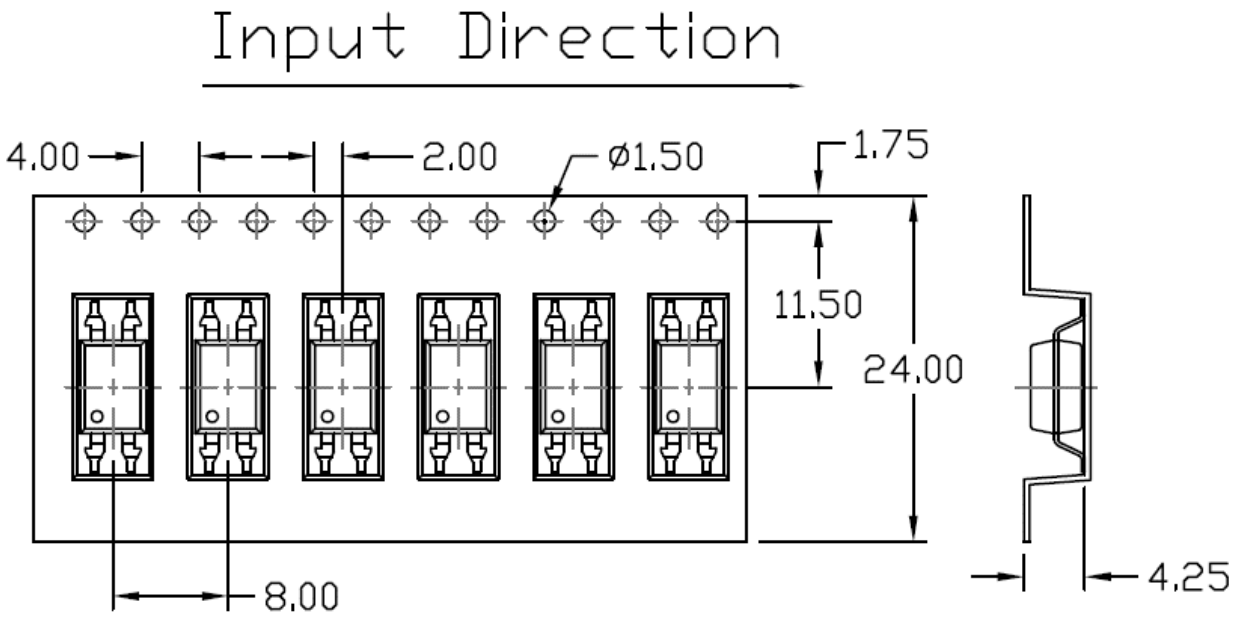

**Option S(T4) & SL(T4)**



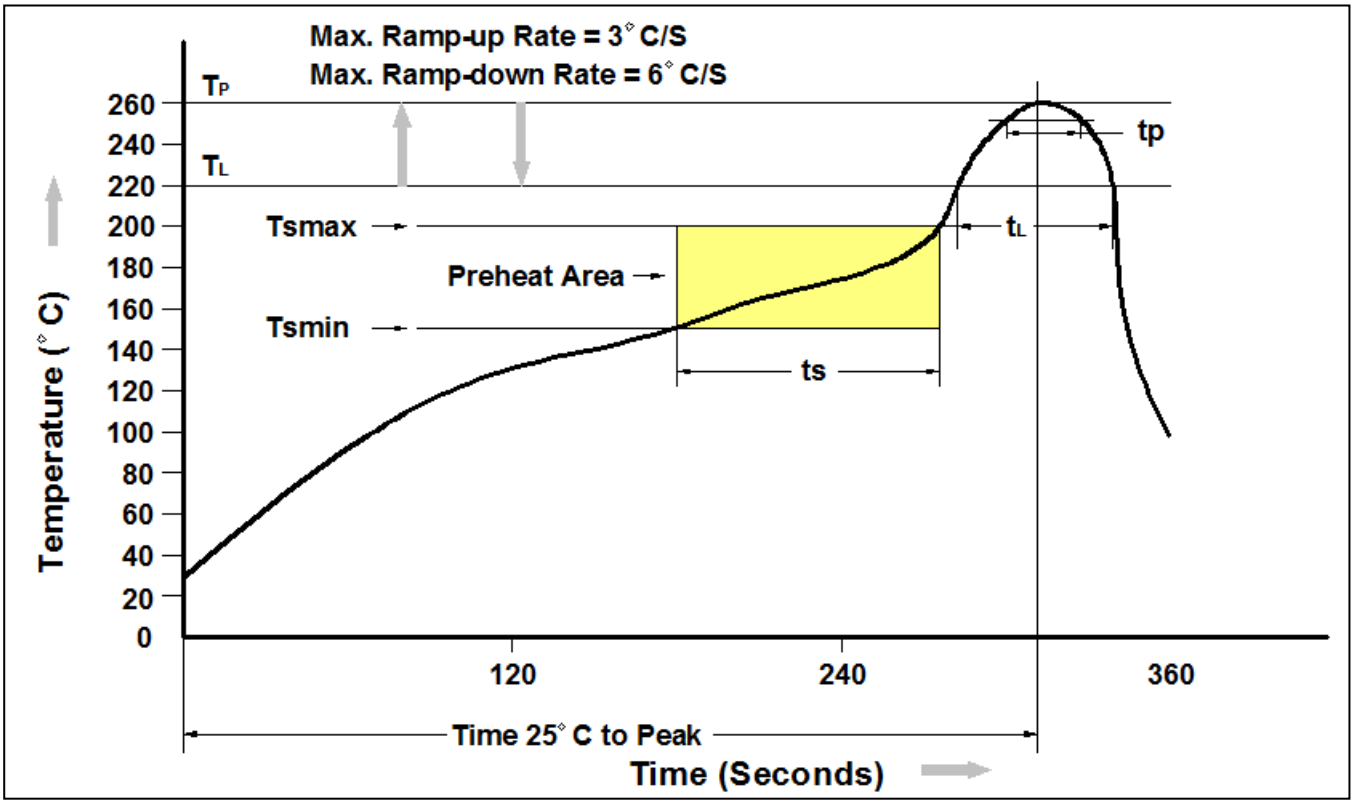
**Option SLM(T1)**




**Option SLM(T2)**



## Reflow Profile




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

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2. *A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.*