



Input 4-Pin Mini-Flat Phototransistor Optocoupler

Features

- High isolation 3750 V_{RMS}
- Multiple CTR selection available
- Creepage distance $\geq 5\text{mm}$
- Operating temperature range - 55 °C to 110 °C
- Green Package
- Regulatory Approvals
 - UL - UL1577 (Pending Approval)
 - VDE - EN60747-5-5 (Pending Approval)
 - CQC – GB4943.1, GB8898 (Pending Approval)
 - IEC60065, IEC60950 (Pending Approval)

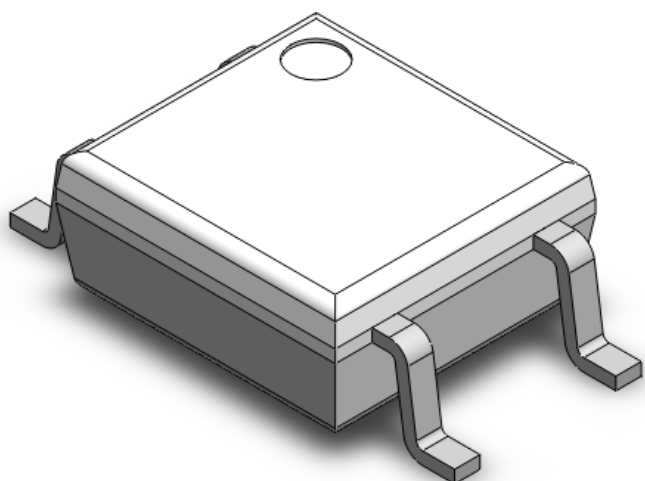
Description

CT185GB of general purpose optocoupler consists of a photo transistor optically coupled to a gallium arsenide Infrared-emitting diode in a 4-lead Mini-Flat package.

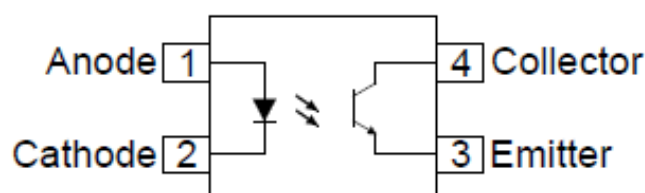
Applications

- DC-DC Converters
- Programmable controllers
- Telecommunication equipment
- Hybrid substrates that require high density mounting

Package Outline



Schematic



CT185

**Input 4-Pin Mini-Flat Phototransistor Optocoupler****Absolute Maximum Rating at 25°C**

| Symbol | Parameters | Ratings | Units | Notes |
|-----------------------|--|----------------|------------------|--------------|
| V _{ISO} | Isolation voltage | 3750 | V _{RMS} | |
| T _{OPR} | Operating temperature | -55 ~ +110 | °C | |
| T _{STG} | Storage temperature | -55 ~ +150 | °C | |
| T _{SOL} | Soldering temperature | 260 | °C | |
| 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 | |
| V _R | Reverse voltage | 6 | V | |
| 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 | |



Input 4-Pin Mini-Flat Phototransistor Optocoupler

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 | 1.4 | V | |
| I_R | Reverse Current | $V_R = 5\text{V}$ | - | - | 5 | μA | |
| C_{IN} | Input Capacitance | $f = 1\text{MHz}$ | - | 10 | 250 | pF | |

Detector Characteristics

| Symbol | Parameters | Test Conditions | Min | Typ | Max | Units | Notes |
|---------------|--------------------------------|---|-----|------|------|---------------|-------|
| $B_{V_{CEO}}$ | Collector-Emitter Breakdown | $I_C = 500\mu\text{A}$ | 80 | - | - | V | |
| $B_{V_{ECO}}$ | Emitter-Collector Breakdown | $I_E = 100\mu\text{A}$ | 7 | - | - | V | |
| I_{CEO} | Collector-Emitter Dark Current | $V_{CE} = 48\text{V}$ | - | 0.01 | 0.08 | μA | |
| | | $V_{CE} = 48\text{V}, T_A = 85^\circ\text{C}$ | - | 2 | 50 | μA | |
| C_{CE} | Collector-Emitter Capacitance | $f = 1\text{MHz}$ | - | 10 | - | pF | |

Transfer Characteristics

| Symbol | Parameters | Test Conditions | Min | Typ | Max | Units | Notes |
|---------------|--------------------------------------|--|-----|-----|-----|---------------|-------|
| CTR | Current Transfer Ratio | $I_F = 5\text{mA}, V_{CE} = 5\text{V}$ | 100 | - | 400 | % | |
| | | $I_F = 1\text{mA}, V_{CE} = 0.4\text{V}$ | 30 | - | - | % | |
| $V_{CE(SAT)}$ | Collector-Emitter Saturation Voltage | $I_F = 8\text{mA}, I_C = 2.4\text{mA}$ | - | - | 0.3 | V | |
| $I_{C(off)}$ | Off-state collector current | $V_{CE} = 48\text{V}, V_F = 0.7\text{V}$ | - | 1 | 10 | μA | |



Input 4-Pin Mini-Flat Phototransistor Optocoupler

Isolation Characteristics

| Symbol | Parameters | Test Conditions | Min | Typ | Max | Units | Notes |
|------------------|-----------------------|--------------------------------------|--------------------|------------------|-----|------------------|-------|
| R _{IO} | Isolation Resistance | V _{IO} = 500V _{DC} | 1x10 ¹² | 10 ¹⁴ | - | Ω | |
| C _{IO} | Isolation Capacitance | f=1MHz | - | 0.5 | - | pF | |
| V _{ISO} | Isolation voltage | AC, 60s | 3750 | - | - | V _{rms} | |
| | | AC, 1s in oil | - | 10000 | - | | |
| | | DC, 60s in oil | - | 10000 | - | | |

Switching Characteristics

| Symbol | Parameters | Test Conditions | Min | Typ | Max | Units | Notes |
|------------------|---------------|--|-----|-----|-----|-------|-------|
| t _r | Rise Time | V _{CC} = 10V, I _C = 2mA, R _L = 100Ω | - | 5 | - | μs | |
| t _f | Fall Time | | - | 9 | - | | |
| t _{on} | Turn-on time | | - | 9 | - | | |
| t _{off} | Turn-off time | | - | 9 | - | | |
| t _{on} | Turn-on time | V _{CC} = 5V, I _F = 16mA, R _L = 1.9kΩ | - | 2 | - | | |
| t _s | Storage time | | - | 30 | - | | |
| t _{off} | Turn-off time | | - | 70 | - | | |



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Typical Characteristic Curves

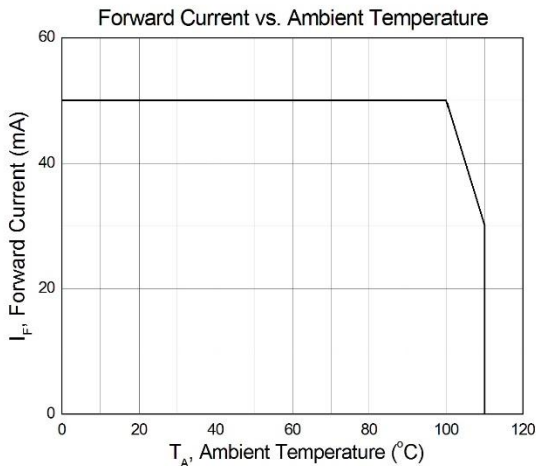


Figure 1

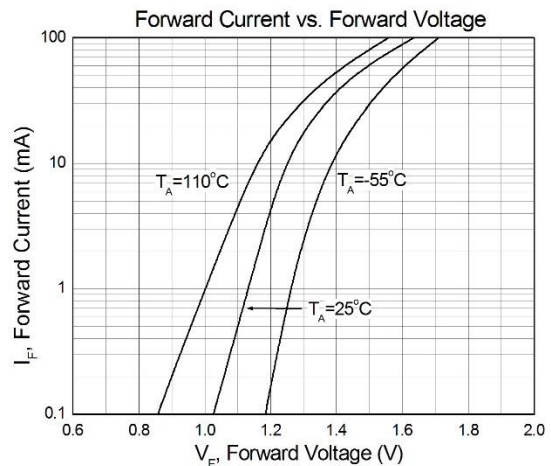


Figure 2

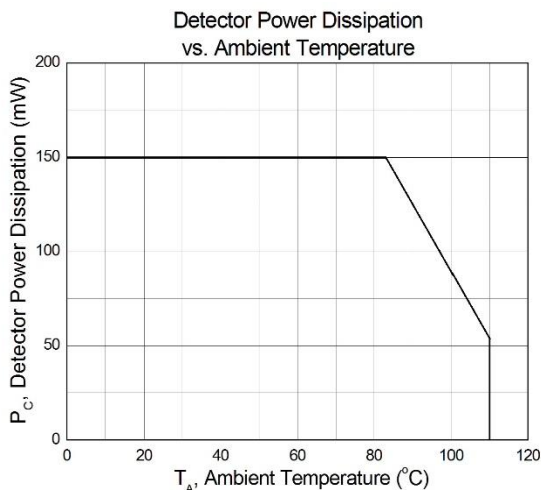


Figure 3

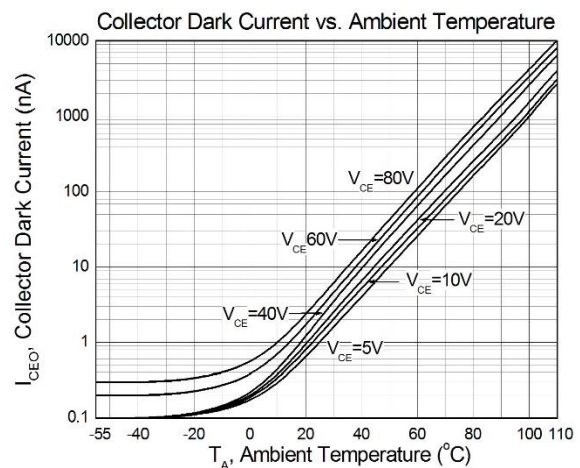


Figure 4

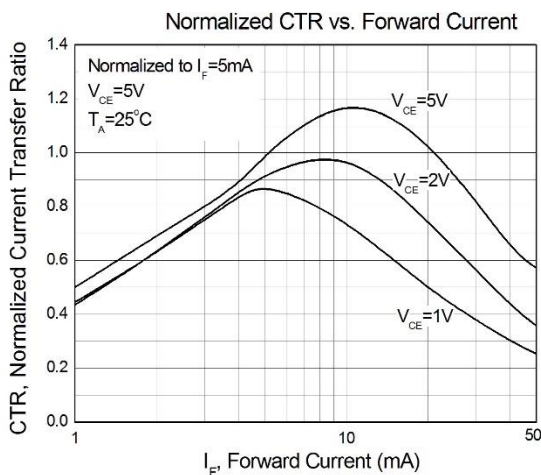


Figure 5

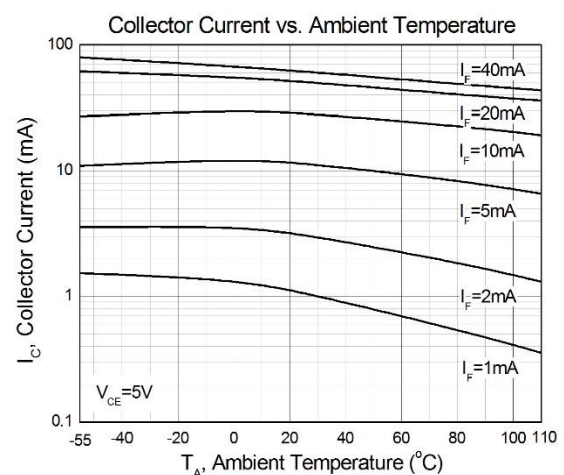


Figure 6



Input 4-Pin Mini-Flat Phototransistor Optocoupler

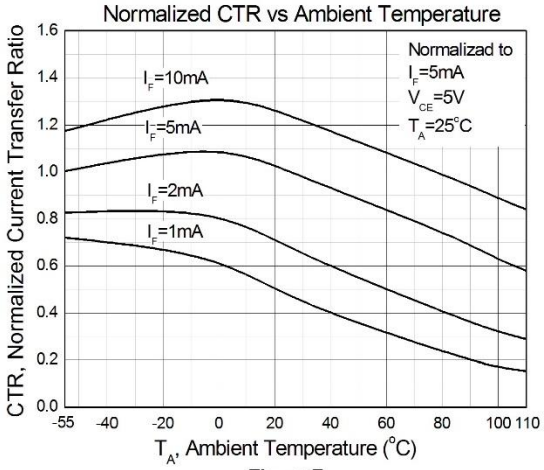


Figure 7

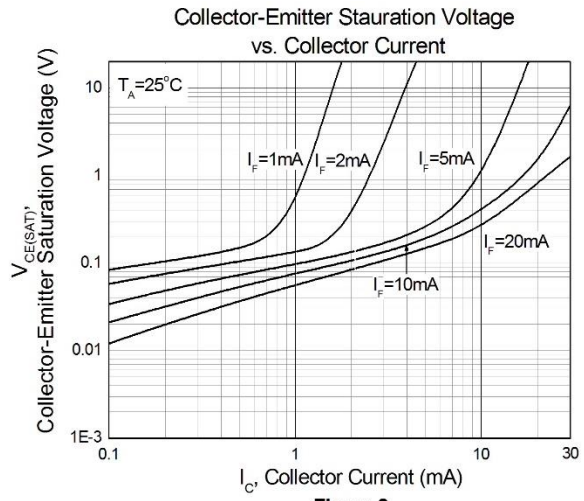


Figure 8

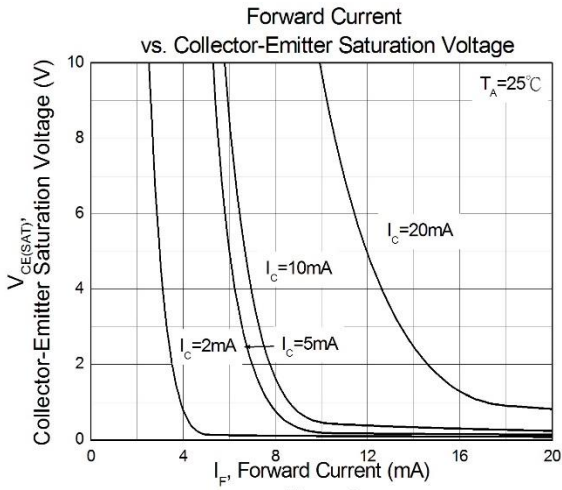


Figure 9

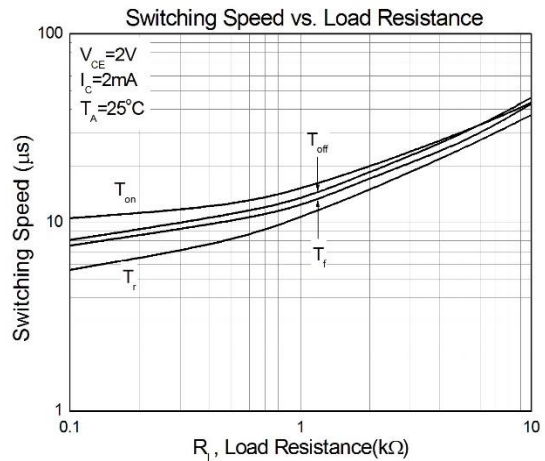


Figure 10

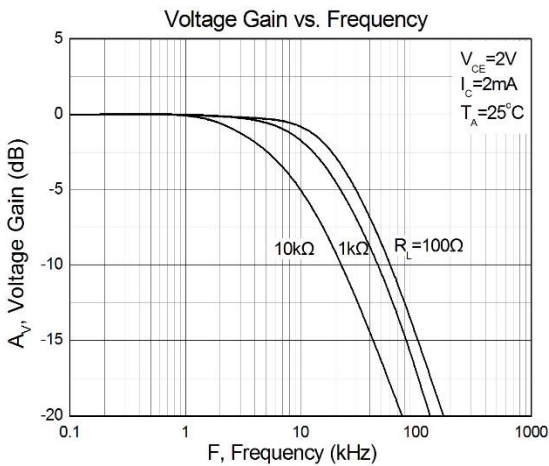
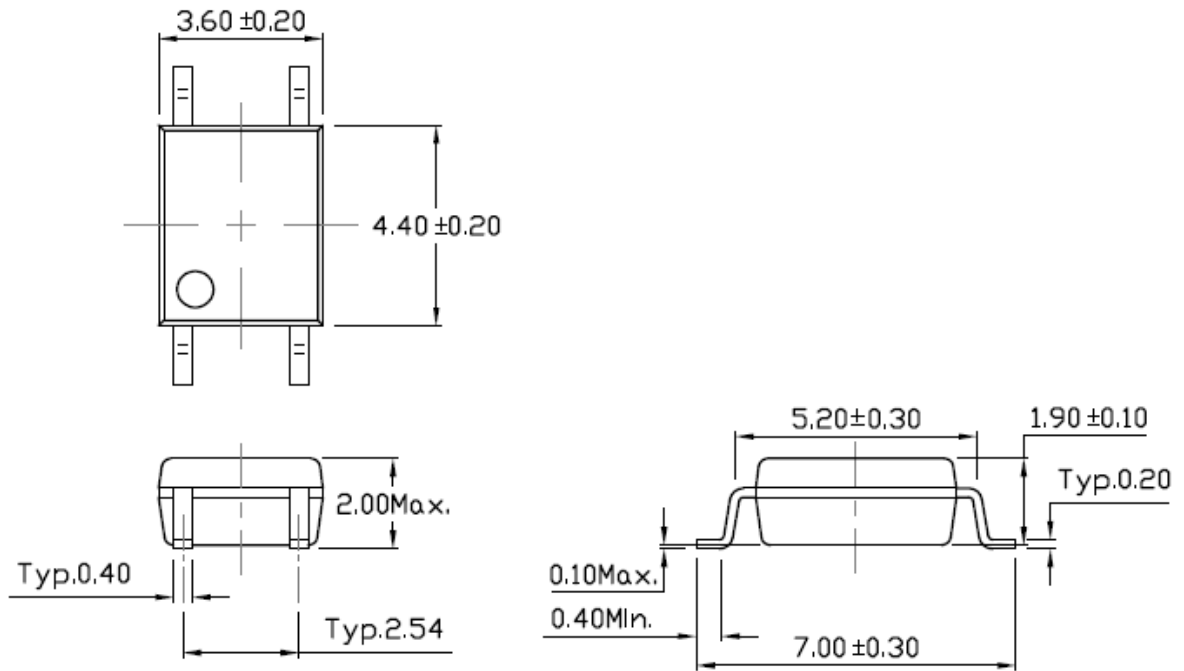


Figure 11

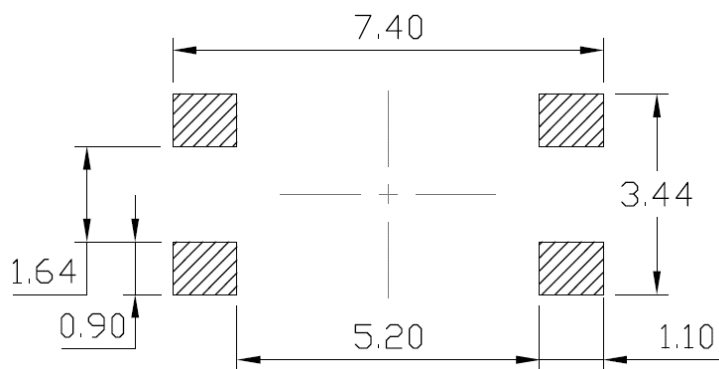


Input 4-Pin Mini-Flat Phototransistor Optocoupler

Package Dimension *Dimensions in mm unless otherwise stated*



Recommended Solder Mask *Dimensions in mm unless otherwise stated*





Input 4-Pin Mini-Flat Phototransistor Optocoupler

Marking Information



Note:

- CT : Denotes “CT Micro”
- 185 : Part Number
- GB : CTR Rank
- V : VDE Safety Option (V or none)
- Y : Fiscal Year
- WW : Work Week
- K : Manufacturing Code

Ordering Information

CT185GB(V)(Y)

- CT : Denotes “CT Micro”
- 185 : Part Number
- GB : CTR Rank
- V : VDE Safety Option (V or none)
- Y : Tape and reel option (T1 or T2)

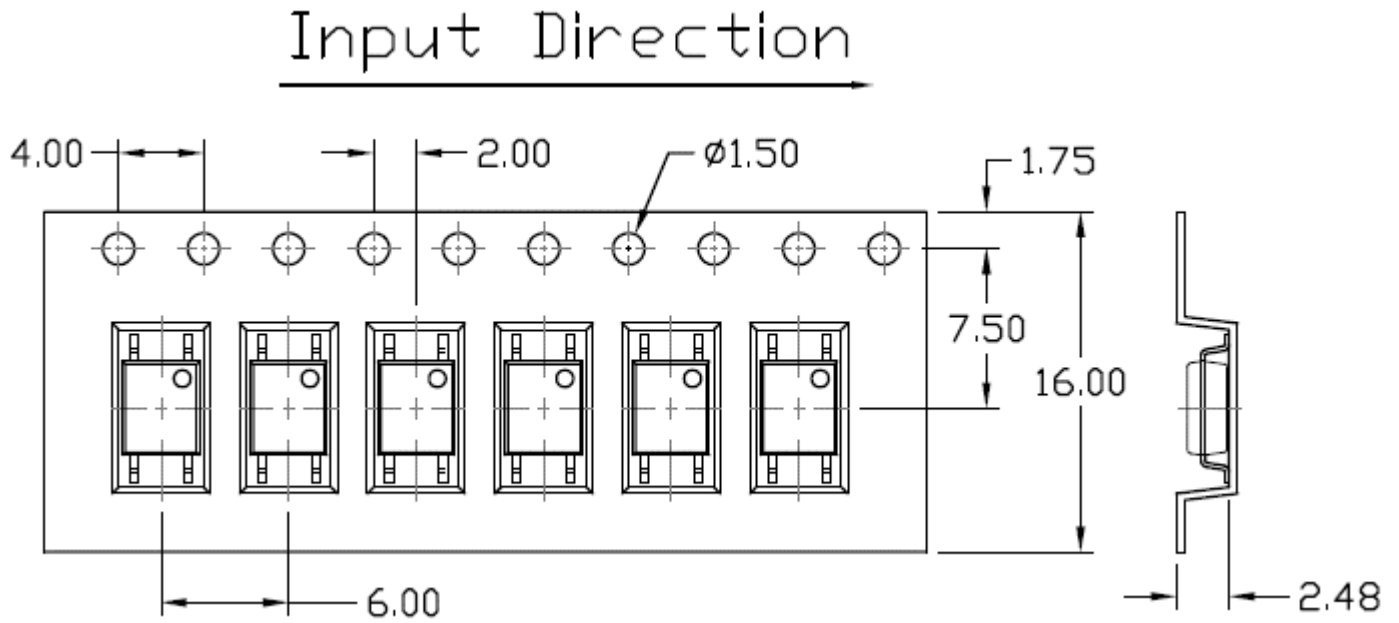
| Option | Description | Quantity |
|---------------|--|-----------------|
| T1 | Surface Mount Lead Forming – With Option 1 Tapping | 3000 Units/Reel |
| T2 | Surface Mount Lead Forming – With Option 2 Tapping | 3000 Units/Reel |



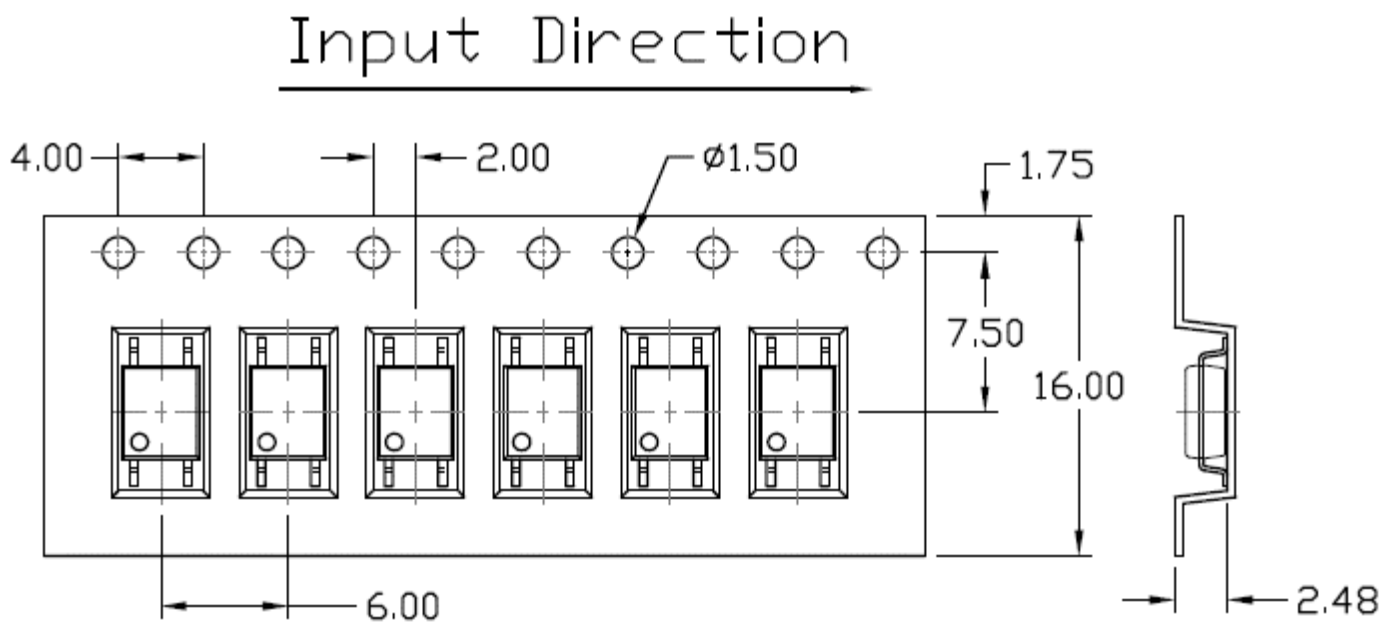
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Carrier Tape Specifications *Dimensions in mm unless otherwise stated*

Option T1



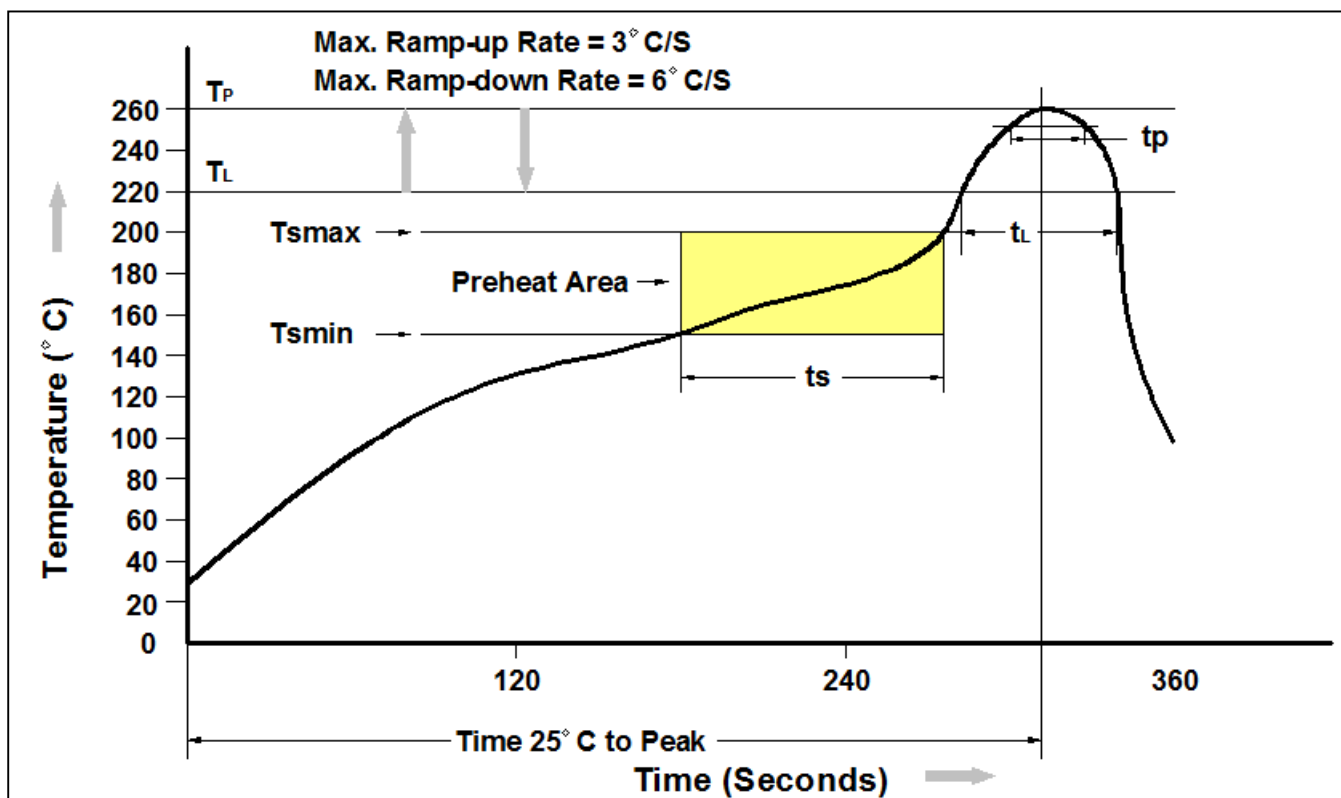
Option T2





Input 4-Pin Mini-Flat Phototransistor Optocoupler

Reflow Profile



| 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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