



DC Input 16-Pin DMC-Isolator® Half Pitch Mini-Flat Phototransistor Optocoupler

Features

- High isolation 3750 VRMS
- Patented coplanar structure DMC-Isolator®
- Various CTR selection available
- DC input with transistor output
- Operating temperature range - 55 °C to 125 °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 (19001231772)
 - ✓ IEC62368 (FI/41119)

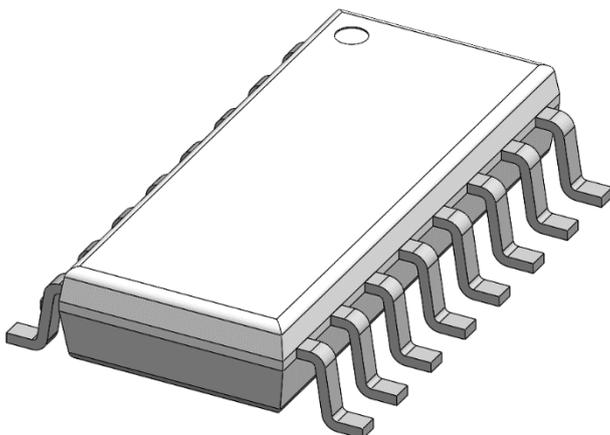
Description

The CTH247 series have four isolated channels, each channel contains a photo transistor optically coupled to an Infrared-emitting diode in a 16-lead half pitch Mini-Flat DMC-Isolator® package.

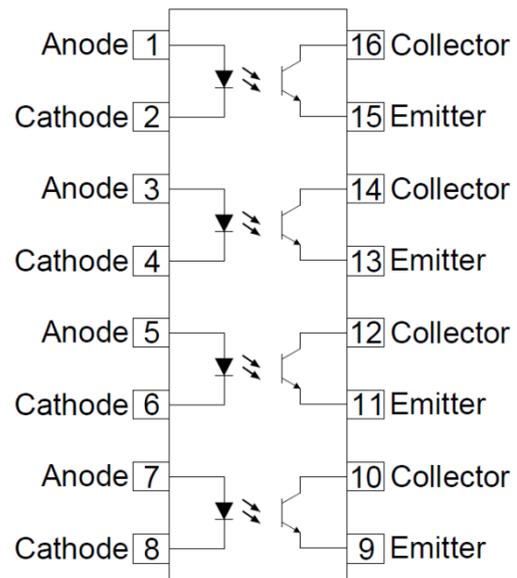
Applications

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

Package Outline



Schematic





CTH247 Series DC Input 16-Pin DMC-Isolator® Half Pitch Mini-Flat Phototransistor 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_{ISO} | Isolation voltage (AC, 1 minute, 40 ~ 60% R.H.) | 3750 | V_{RMS} | |
| T_{OPR} | Operating temperature | -55 ~ +125 | $^{\circ}\text{C}$ | |
| T_{STG} | Storage temperature | -55 ~ +150 | $^{\circ}\text{C}$ | |
| T_{SOL} | Soldering temperature (For 10 seconds) | 260 | $^{\circ}\text{C}$ | 1 |
| P_{TOT} | Total power dissipation | 200 | mW | |
| Emitter | | | | |
| I_F | Forward current | 50 | mA | 2 |
| $I_{F(TRANS)}$ | Peak transient current ($\leq 1\mu\text{s P.W, 300pps}$) | 1 | A | 2 |
| V_R | Reverse voltage | 6 | V | 2 |
| P_D | Power dissipation | 70 | mW | 2 |
| T_J | Junction temperature | 125 | $^{\circ}\text{C}$ | 2 |
| Detector | | | | |
| P_C | Power dissipation | 100 | mW | 2 |
| B_{VCEO} | Collector-Emitter Breakdown Voltage | 80 | V | 2 |
| B_{VECO} | Emitter-Collector Breakdown Voltage | 7 | V | 2 |
| I_C | Collector Current | 50 | mA | 2 |

Notes

1. For reflow process
2. Each Channel



CTH247 Series DC Input 16-Pin DMC-Isolator® Half Pitch 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 | $V_R = 6\text{V}$ | - | - | 5 | μA | |
| C_{IN} | Input Capacitance | $f = 1\text{MHz}$ | - | 10 | 30 | pF | |

Detector Characteristics

| Symbol | Parameters | Test Conditions | Min | Typ | Max | Units | Notes |
|---------------|--------------------------------|---|-----|-----|-----|-------|-------|
| $B_{V_{CEO}}$ | Collector-Emitter Breakdown | $I_C = 0.1\text{mA}$ | 80 | - | - | V | |
| $B_{V_{ECO}}$ | Emitter-Collector Breakdown | $I_E = 0.1\text{mA}$ | 7 | - | - | V | |
| I_{CEO} | Collector-Emitter Dark Current | $V_{CE} = 20\text{V}, I_F = 0\text{mA}$ | - | - | 100 | nA | |

Transfer Characteristics

| Symbol | Parameters | Test Conditions | Min | Typ | Max | Units | Notes | |
|---------------|--------------------------------------|--|--------------------|-----|-----|----------|-------|--|
| CTR | Current Transfer Ratio | $I_F = 5\text{mA}, V_{CE} = 5\text{V}$ | CTH247 | 50 | - | 600 | % | |
| | | | CTH247A | 80 | - | 160 | | |
| | | | CTH247B | 130 | - | 260 | | |
| | | | CTH247C | 200 | - | 400 | | |
| $V_{CE(SAT)}$ | Collector-Emitter Saturation Voltage | $I_F = 20\text{mA}, I_C = 1\text{mA}$ | - | 0.1 | 0.2 | V | | |
| R_{IO} | Isolation Resistance | $V_{IO} = 500\text{V}_{DC}$ | 5×10^{10} | - | - | Ω | | |
| C_{IO} | Isolation Capacitance | $f = 1\text{MHz}$ | - | 0.5 | 1 | pF | | |

Switching Characteristics

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



CTH247 Series DC Input 16-Pin DMC-Isolator® Half Pitch Mini-Flat Phototransistor Optocoupler

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

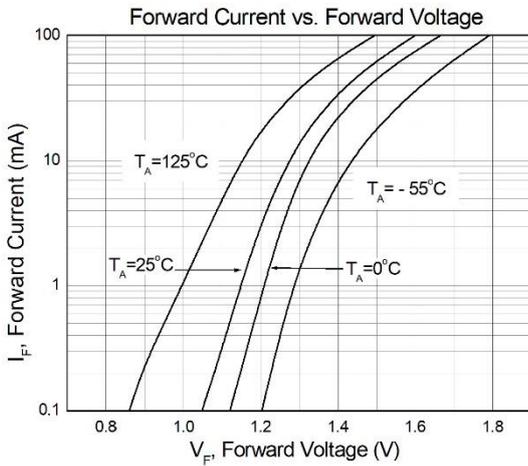


Figure 1

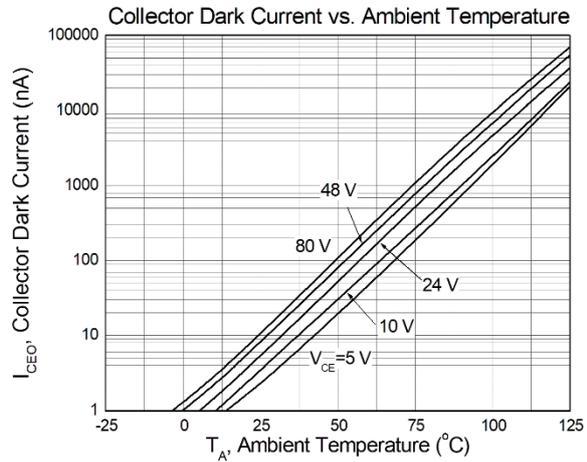


Figure 2

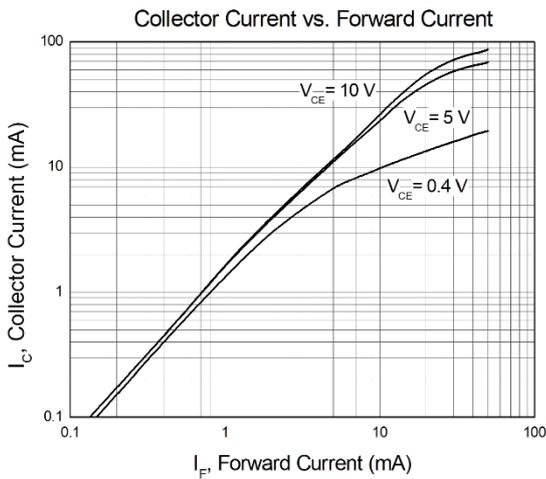


Figure 3

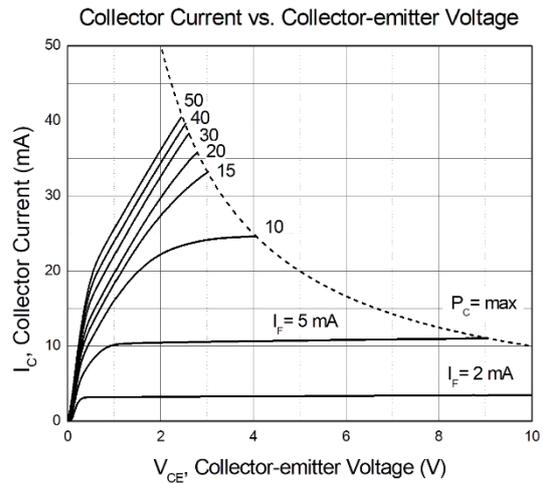


Figure 4

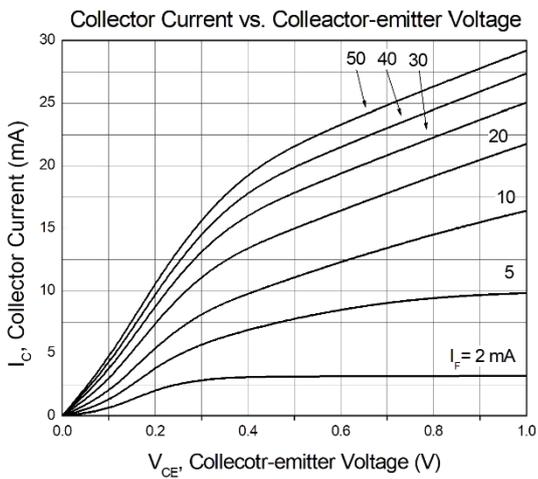


Figure 5

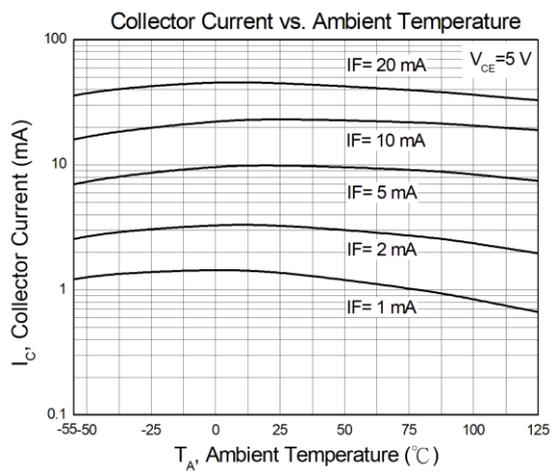


Figure 6



CTH247 Series DC Input 16-Pin DMC-Isolator® Half Pitch Mini-Flat Phototransistor Optocoupler

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

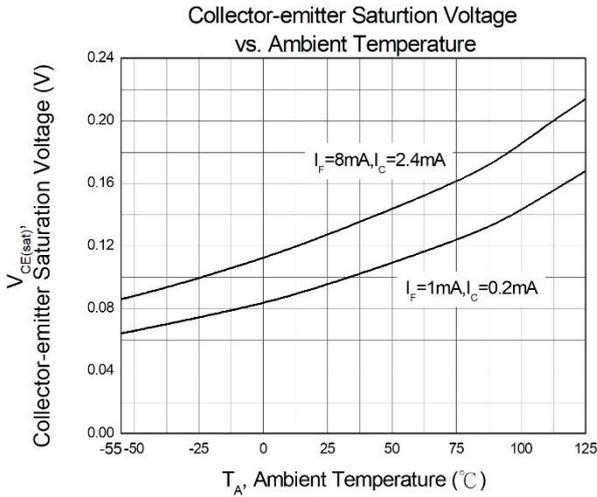


Figure 7

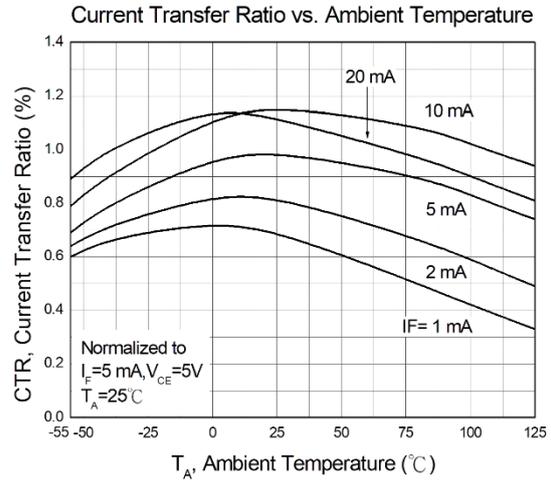


Figure 8

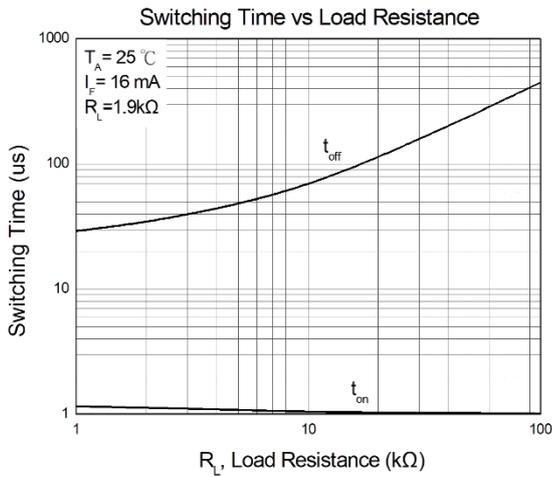


Figure 9

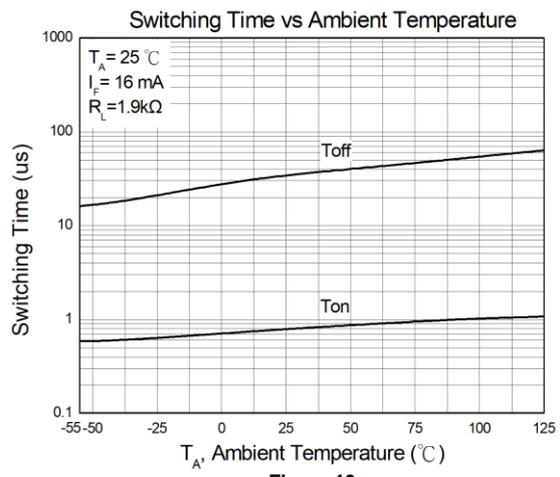


Figure 10



CTH247 Series DC Input 16-Pin DMC-Isolator[®] Half Pitch Mini-Flat Phototransistor Optocoupler

Test Circuit

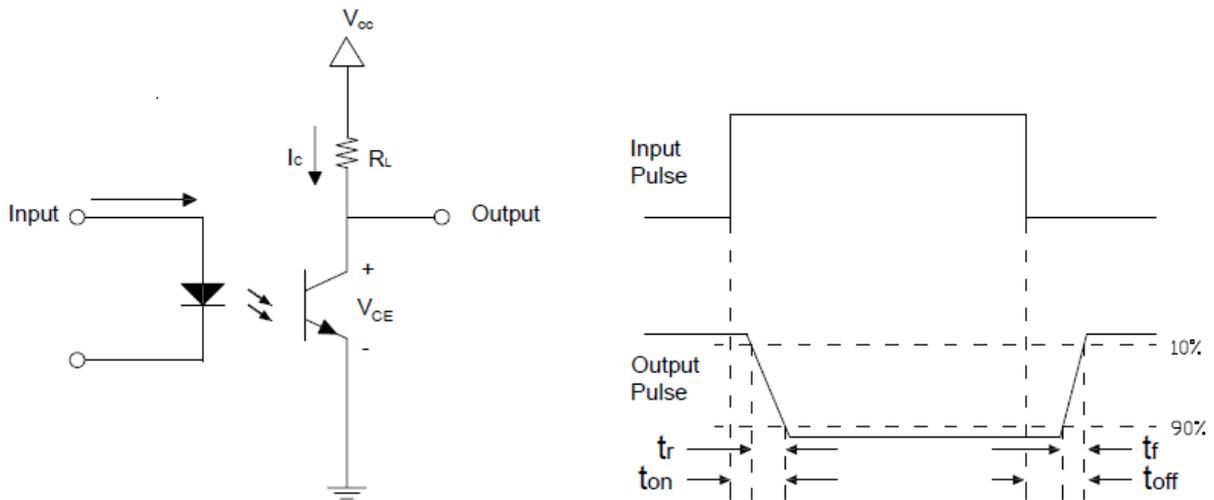
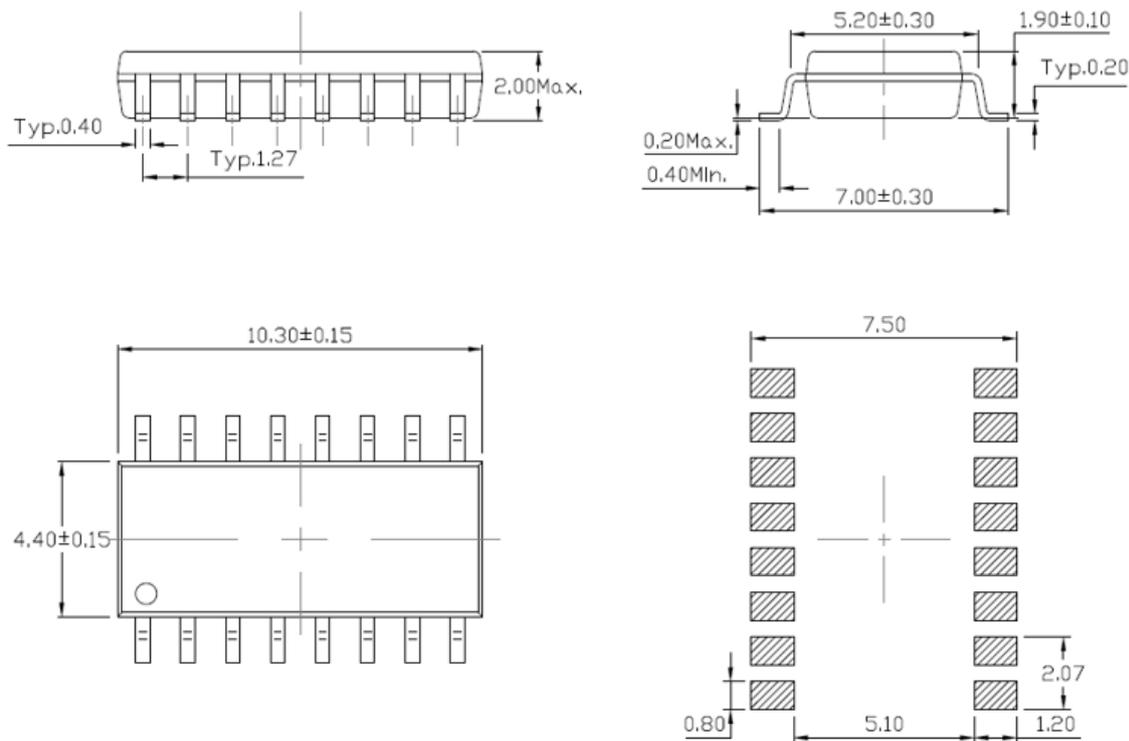


Figure 11: Switching Time Test Circuits

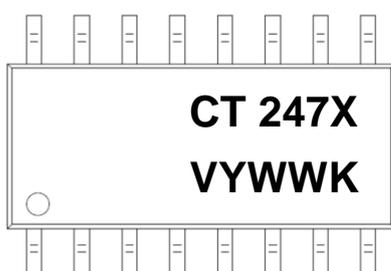


CTH247 Series DC Input 16-Pin DMC-Isolator® Half Pitch Mini-Flat Phototransistor Optocoupler

Package Dimension *Dimensions in mm unless otherwise stated*



Marking Information



Note:

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



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CTH247 Series DC Input 16-Pin DMC-Isolator® Half Pitch Mini-Flat Phototransistor Optocoupler

Ordering Information

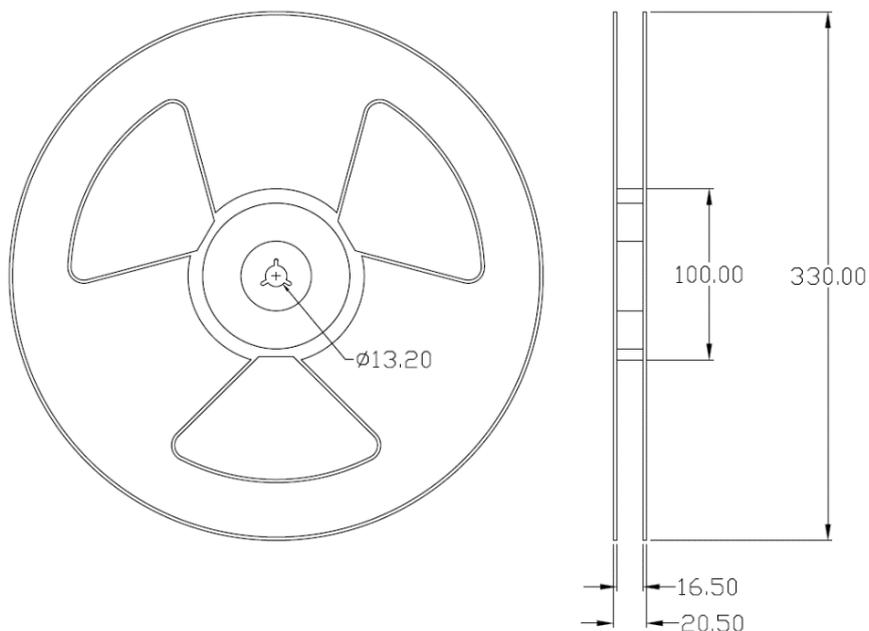
CTH247X (V)(Z)

- CT = Denotes "CT Micro"
- H247 = Part Number
- X = CTR Rank Option (Blank, A, B or C)
- 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 | 2000 Units/Reel |
| T2 | Surface Mount Lead Forming – With Option 1 Taping | 2000 Units/Reel |

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

Option T1/T2

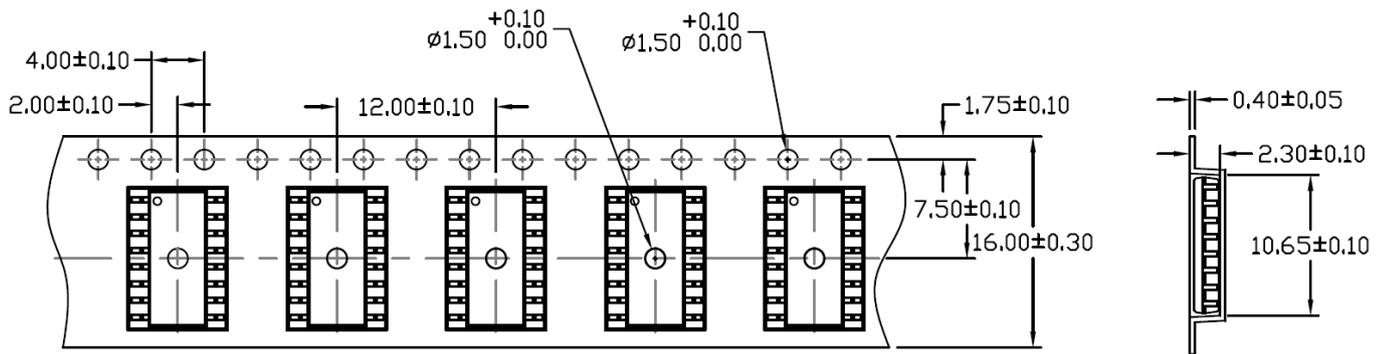




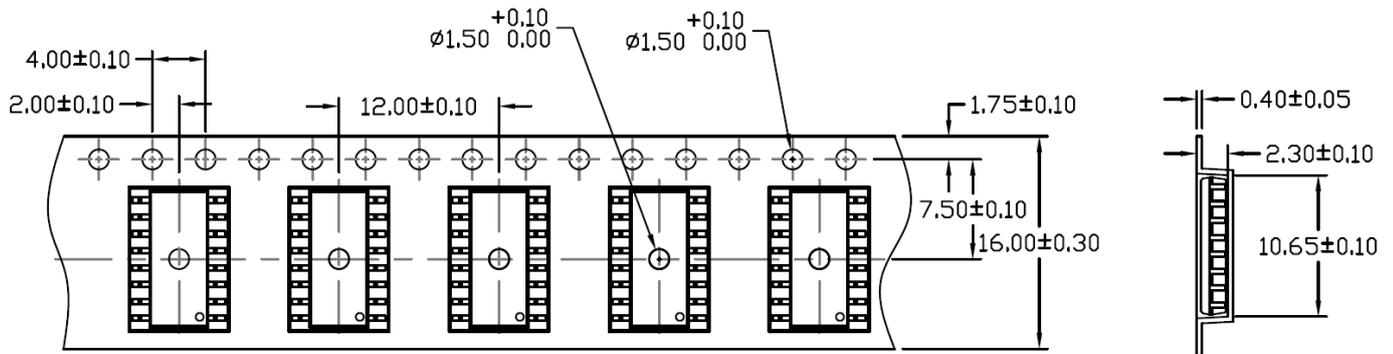
CTH247 Series DC Input 16-Pin DMC-Isolator® Half Pitch Mini-Flat Phototransistor Optocoupler

Carrier Tape Specifications *Dimensions in mm unless otherwise stated*

Option T1



Option T2





CTH247 Series DC Input 16-Pin DMC-Isolator[®] Half Pitch Mini-Flat Phototransistor Optocoupler

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)

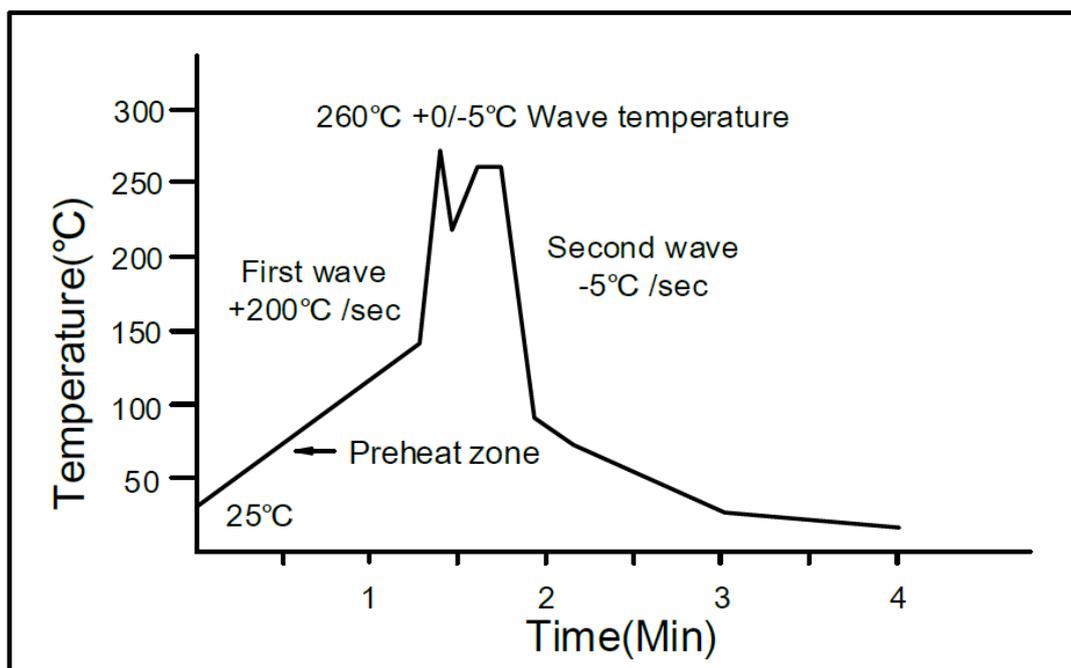
One time soldering is recommended within the condition of temperature.

Temperature: $260 \pm 0/-5^\circ\text{C}$.

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: $350 \pm 10^\circ\text{C}$

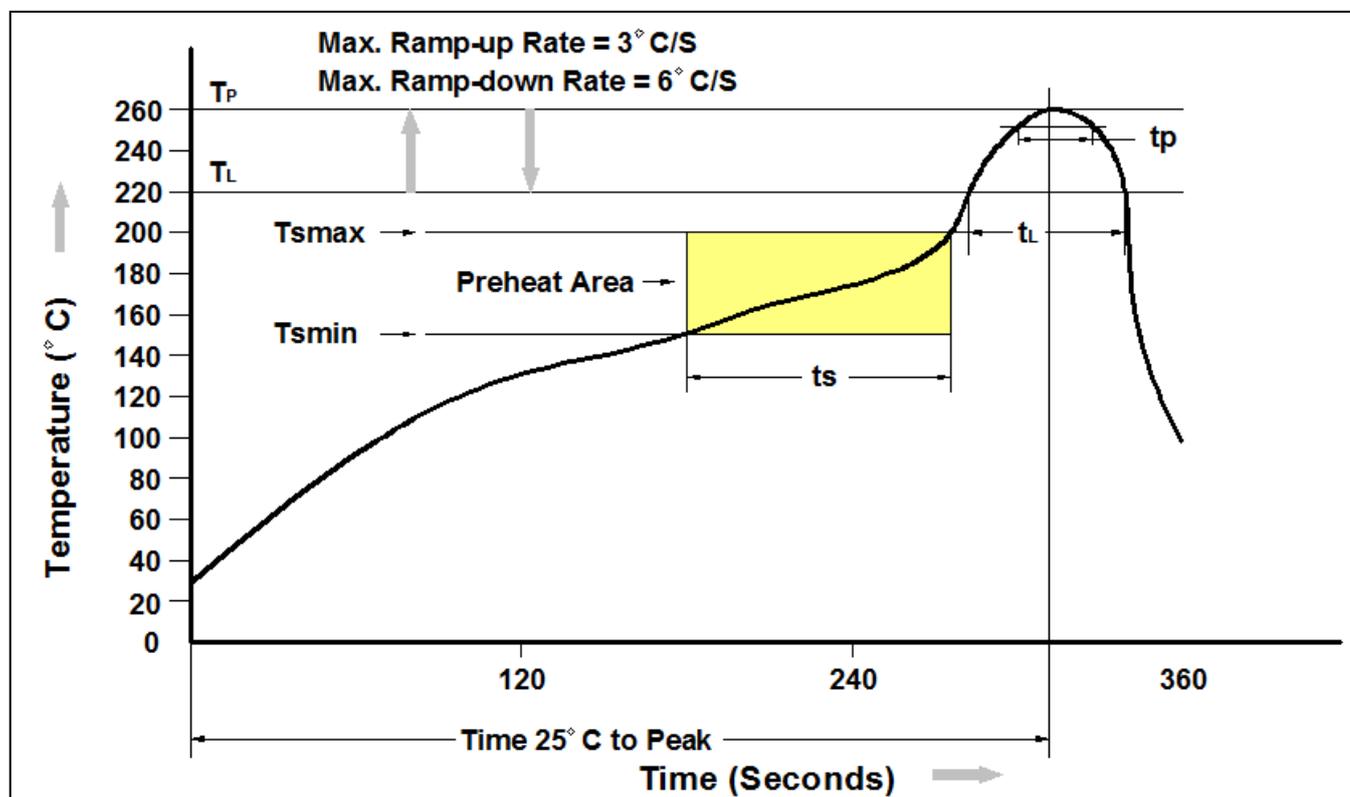
Time: 5 sec max.



CTH247 Series

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



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



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