



# CT451 Series DC Input 4-Pin Mini-Flat DMC-Isolator® High BV<sub>CEO</sub> Phototransistor Optocoupler

## Features

- High isolation 3750 VRMS
- High BV<sub>CEO</sub> = 350V
- Patented coplanar structure DMC-Isolator®
- DC input with Darlington 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
- Regulatory Approvals
  - ✓ UL - UL1577 (E364000)
  - ✓ VDE - EN60747-5-5(40039590)
  - ✓ CQC – GB4943.1, GB8898 (14001105803)
  - ✓ IEC62368 (FI/41119)

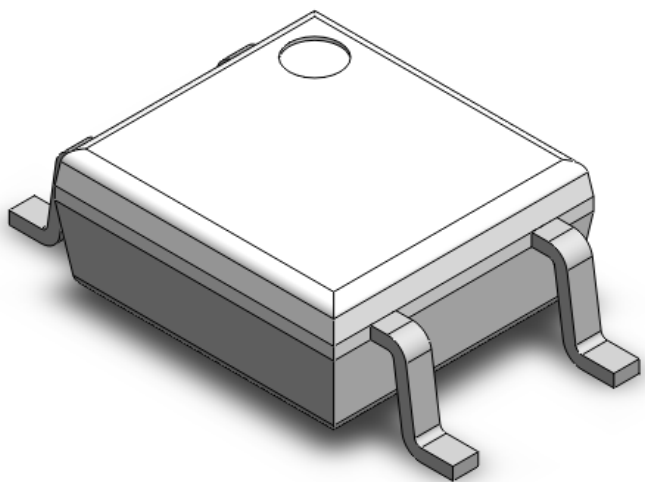
## Description

The CT451 series consists of a High collector- emitter voltage optically coupled to an Infrared-emitting diode in a 4-lead Mini-Flat DMC-Isolator® package with bending option.

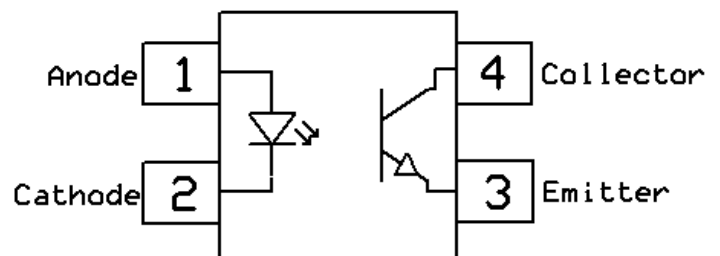
## Applications

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

## Package Outline



## Schematic





DC Input 4-Pin Mini-Flat DMC-Isolator®  
High BVceo 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 <sub>ISO</sub>	Isolation voltage (AC, 1 minute)	3750	V <sub>RMS</sub>	
P <sub>TOT</sub>	Total power dissipation	260	mW	
T <sub>OPR</sub>	Operating temperature	-55 ~ +110	°C	
T <sub>STG</sub>	Storage temperature	-55 ~ +150	°C	
T <sub>SOL</sub>	Soldering temperature	260	°C	
<b>Emitter</b>				
I <sub>F</sub>	Forward current	60	mA	
I <sub>F(TRANS)</sub>	Peak transient current (Duty cyc 60% , pulse width<600ms)	100	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	150	mW	
<b>Detector</b>				
P <sub>D</sub>	Power dissipation	300	mW	
B <sub>VCEO</sub>	Collector-Emitter Breakdown Voltage	350	V	
B <sub>VECO</sub>	Emitter-Collector Breakdown Voltage	7	V	
I <sub>C</sub>	Collector Current	100	mA	

Note:

1. When plan operating current I<sub>F</sub> condition, the I<sub>C</sub> current limit must be considered.



## DC Input 4-Pin Mini-Flat DMC-Isolator® High BV<sub>ceo</sub> Phototransistor Optocoupler

### Electrical Characteristics *T<sub>A</sub> = 25°C (unless otherwise specified)*

#### Emitter Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
V <sub>F</sub>	Forward voltage	I <sub>F</sub> =10mA	-	1.2	1.4	V	
I <sub>R</sub>	Reverse Current	V <sub>R</sub> = 6V	-	-	5	μA	
C <sub>IN</sub>	Input Capacitance	f= 1MHz	-	30	-	pF	

#### Detector Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
B <sub>VCEO</sub>	Collector-Emitter Breakdown	I <sub>C</sub> = 0.1mA	350	-	-	V	
B <sub>VECO</sub>	Emitter-Collector Breakdown	I <sub>E</sub> = 0.1mA	7	-	-	V	
I <sub>CEO</sub>	Collector-Emitter Dark Current	V <sub>CE</sub> = 200V, I <sub>F</sub> =0mA	-	-	100	nA	

#### Transfer Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
CTR	Current Transfer Ratio	I <sub>F</sub> = 5mA, V <sub>CE</sub> = 5V	50	-	600	%	
V <sub>CE(SAT)</sub>	Collector-Emitter Saturation Voltage	I <sub>F</sub> = 20mA, I <sub>C</sub> = 1mA	-	-	0.4	V	
R <sub>IO</sub>	Isolation Resistance	V <sub>IO</sub> = 500V <sub>DC</sub>	5x10 <sup>10</sup>	-	-	Ω	
C <sub>IO</sub>	Isolation Capacitance	f= 1MHz	-	0.5	1	pF	

#### Switching Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
t <sub>r</sub>	Rise Time	I <sub>C</sub> = 2mA, V <sub>CE</sub> = 2V, R <sub>L</sub> = 100Ω	-	6	18	μs	
t <sub>f</sub>	Fall Time		-	8	18		



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

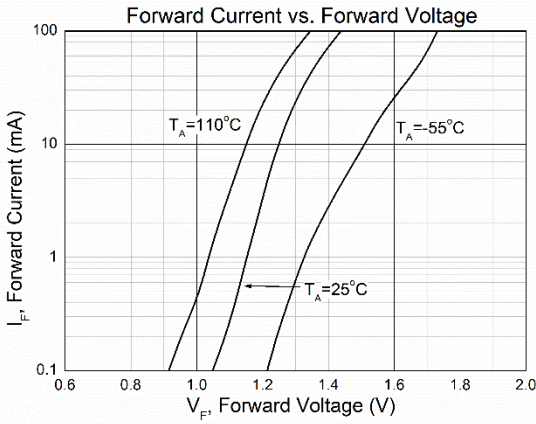


Figure 1

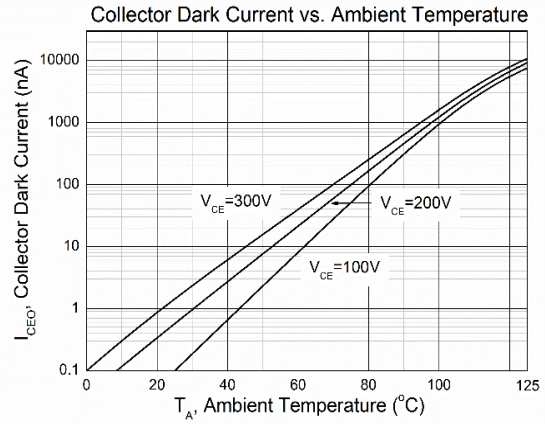


Figure 2

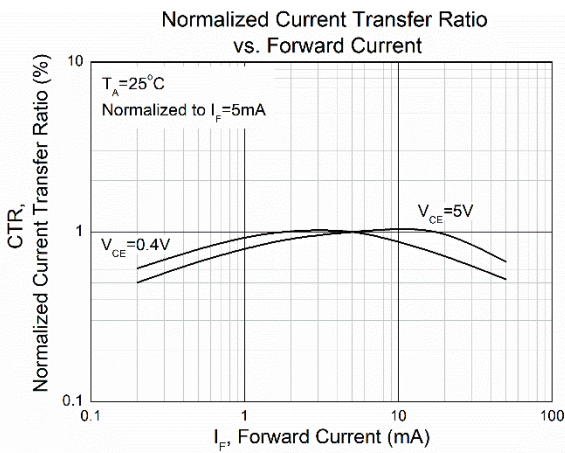


Figure 3

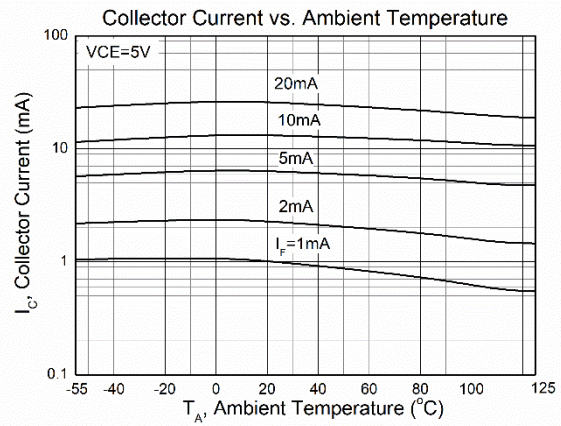


Figure 4

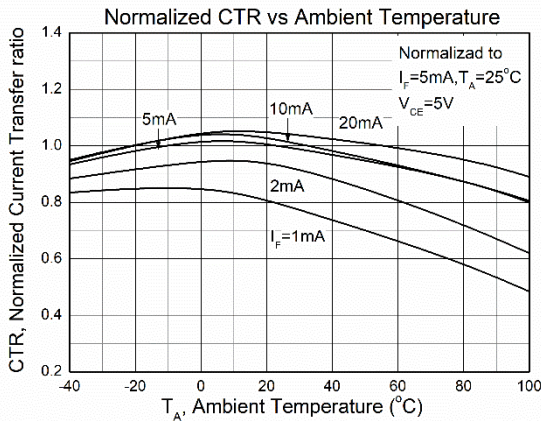


Figure 5

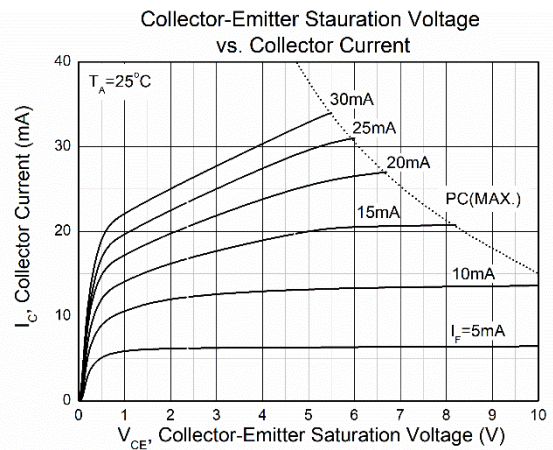


Figure 6



# DC Input 4-Pin Mini-Flat DMC-Isolator<sup>®</sup> High BV<sub>ceo</sub> Phototransistor Optocoupler

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

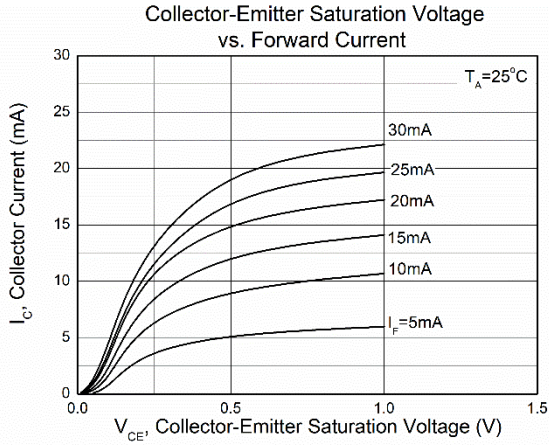


Figure 7

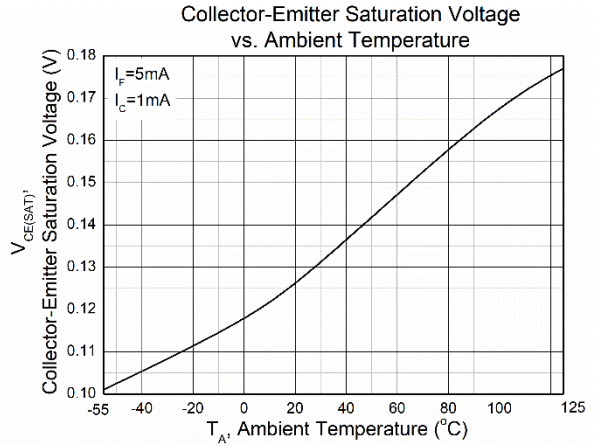


Figure 10

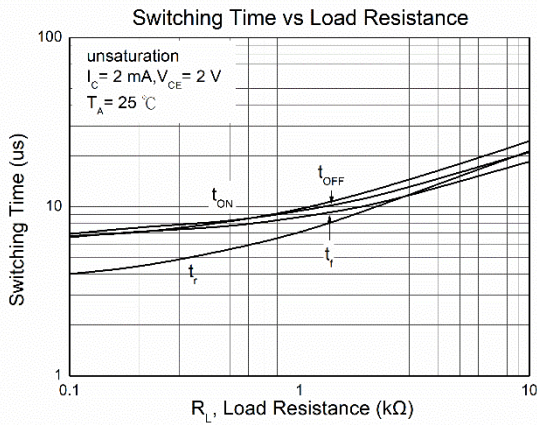


Figure 9



# CT451 Series DC Input 4-Pin Mini-Flat DMC-Isolator® High $BV_{ce0}$ Phototransistor Optocoupler

## Test Circuit

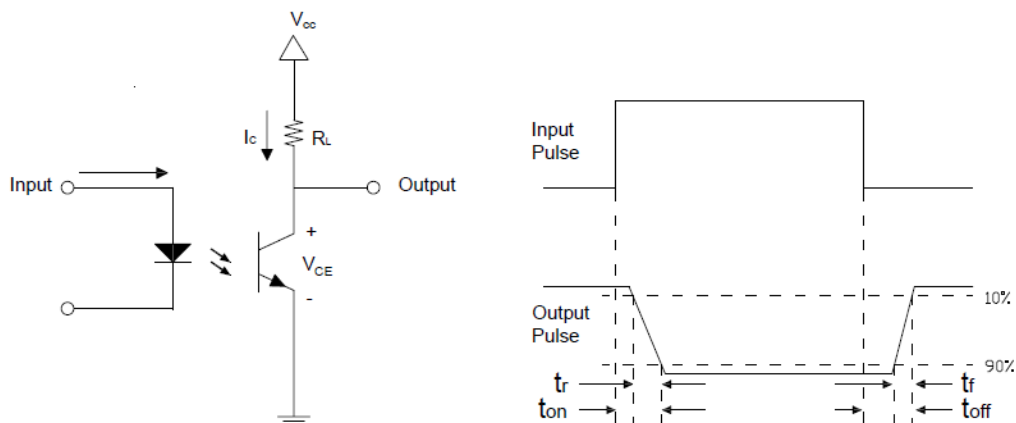
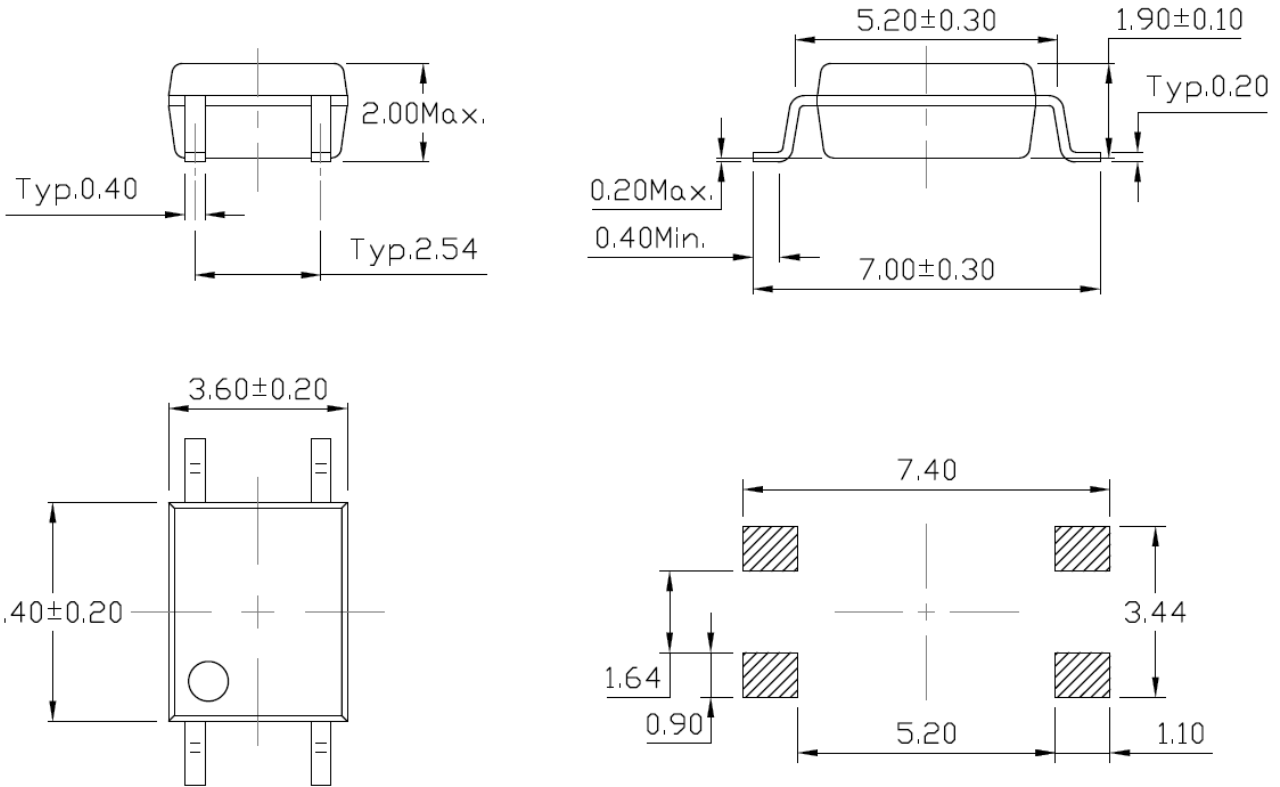


Figure 10: Switching Time Test Circuits



DC Input 4-Pin Mini-Flat DMC-Isolator®  
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Package Dimension *Dimensions in mm unless otherwise stated*



Marking Information



Note:

- CT : Denotes "CT Micro"
- 451 : Part Number
- V : VDE Safety Mark Option (Blank or V)
- Y : One Digit Year Code
- WW : Two Digit Work Week
- K : Manufacturing Code



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# CT451 Series

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### Ordering Information

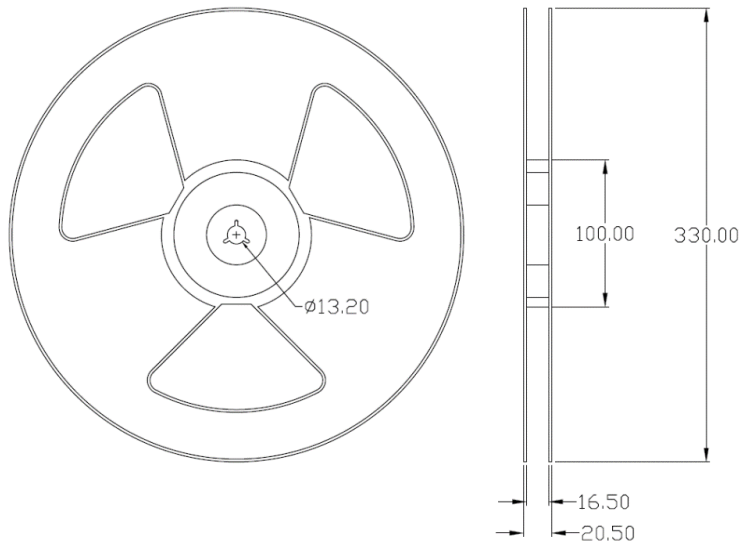
#### CT451 (V)(Z)

- CT = Denotes "CT Micro"
- 451 = Part Number
- 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





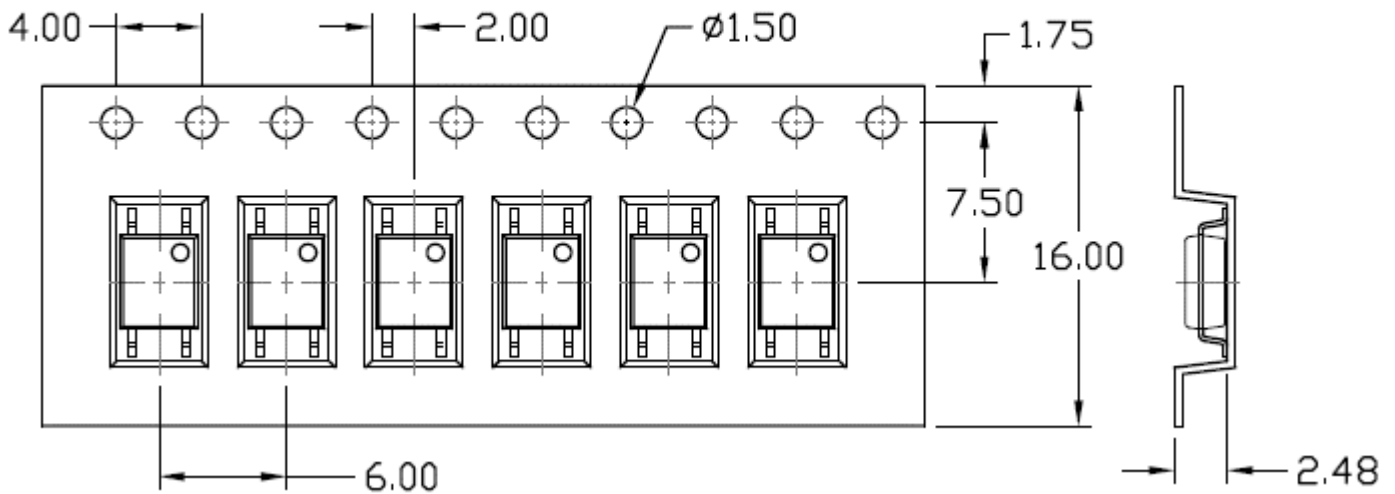


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Carrier Tape Specifications *Dimensions in mm unless otherwise stated*

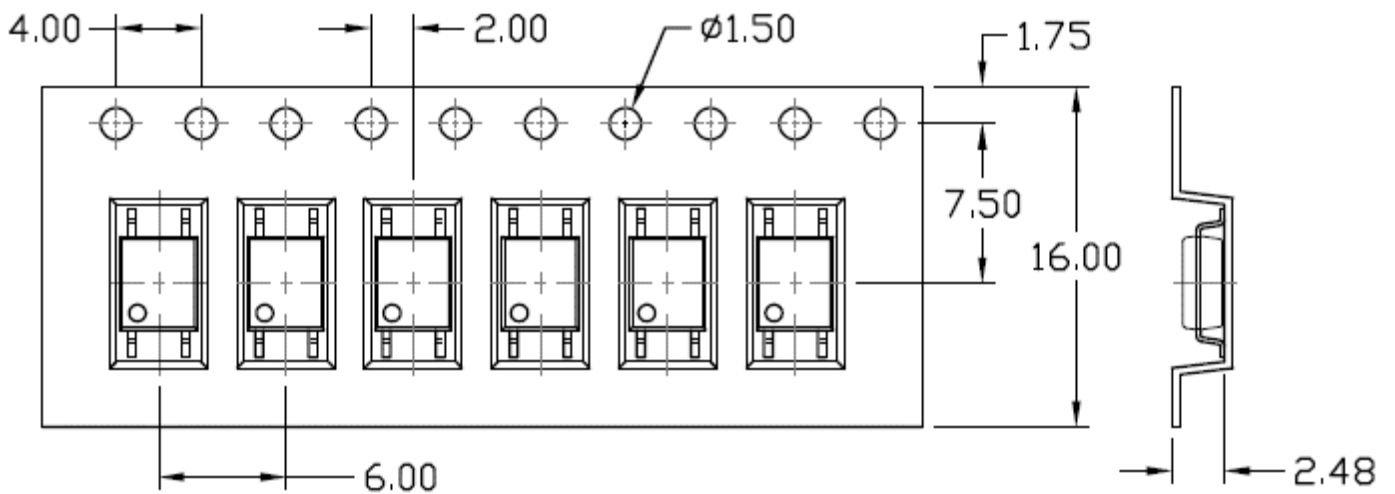
Option T1

Input Direction  
→



Option T2

Input Direction  
→





# DC Input 4-Pin Mini-Flat DMC-Isolator® High BV<sub>ceo</sub> 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)

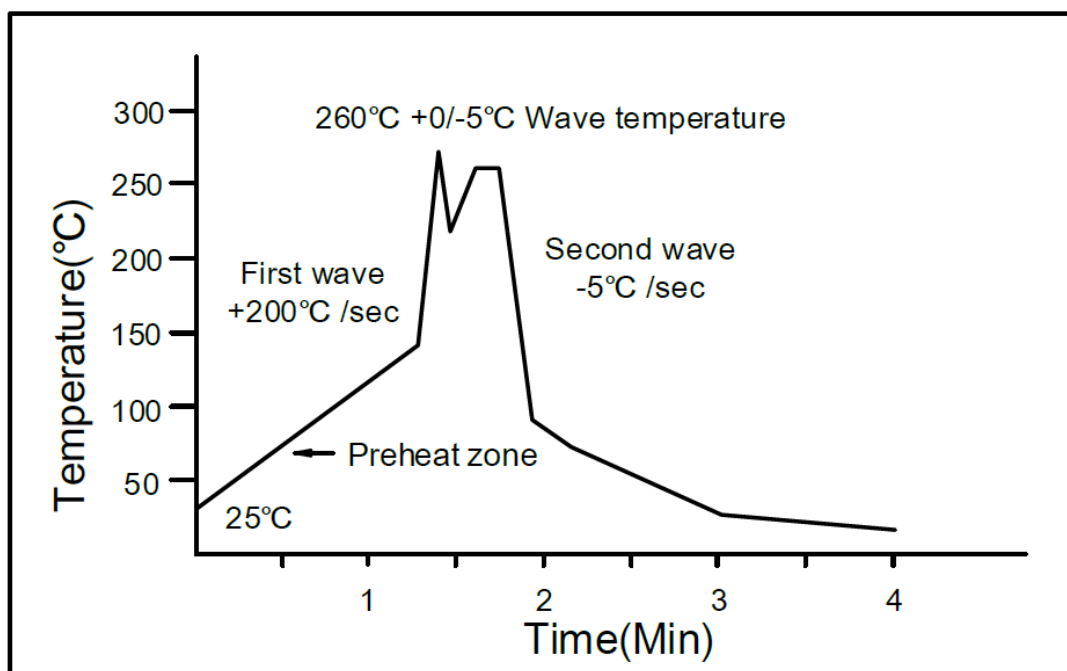
One time soldering is recommended within the condition of temperature.

Temperature: 260+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.

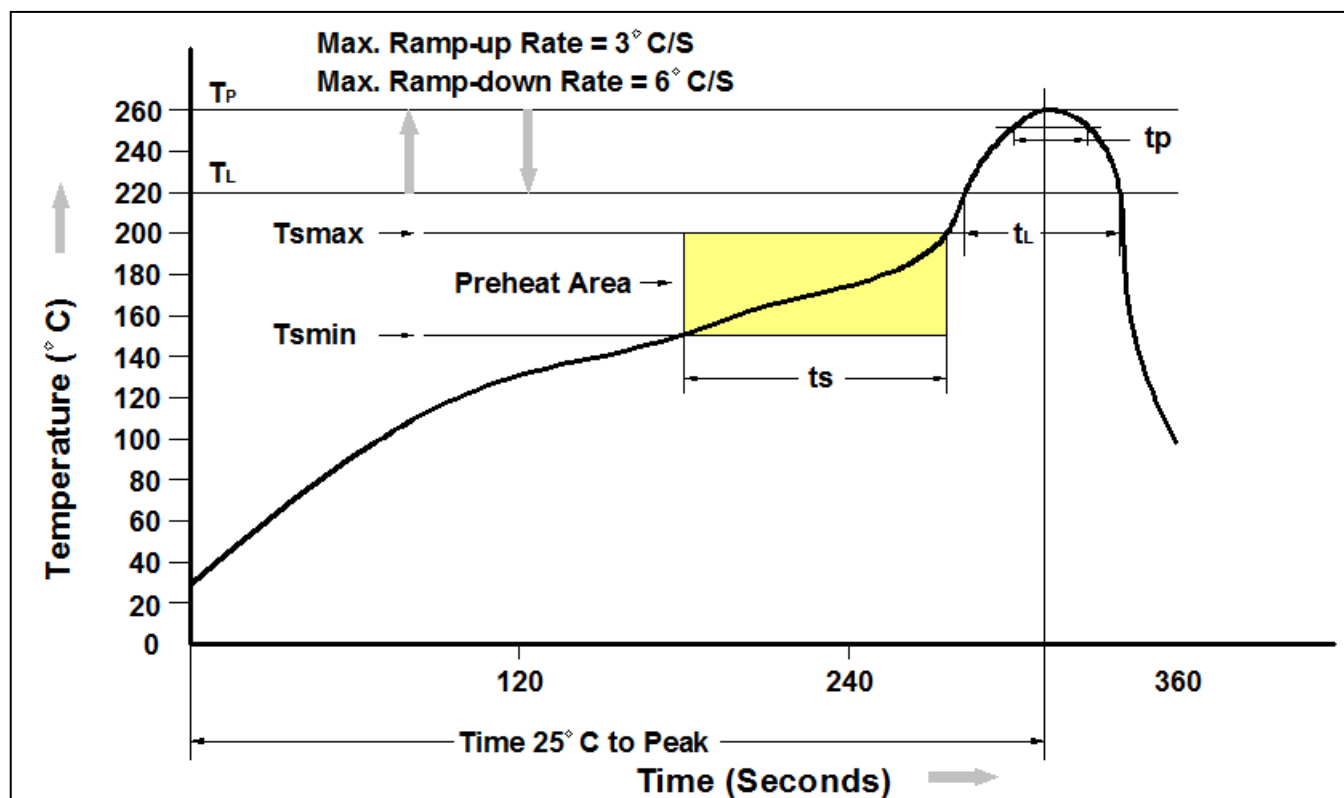
One time soldering is recommended. Temperature: 350±10°C

Time: 5 sec max.



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



Profile Feature	Pb-Free Assembly Profile
Temperature Min. (T <sub>smin</sub> )	150°C
Temperature Max. (T <sub>smax</sub> )	200°C
Time (t <sub>s</sub> ) from (T <sub>smin</sub> to T <sub>smax</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.



# CT451 Series

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### High BV<sub>ceo</sub> Phototransistor Optocoupler

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