



# CT816 Series DC Input 4-Pin DMC-Isolator® Phototransistor Optocoupler

## Features

- High isolation 5000 VRMS
- Patented coplanar structure DMC-Isolator®
- Various CTR selection available
- DC input with Transistor output
- Operating Temperature range - 55 °C to 110 °C
- External creepage distance  $\geq 7.0\text{mm}$
- Distance Through Isolation  $\geq 0.4\text{mm}$
- Clearances Distance  $\geq 7.5\text{mm}$  (S/SL Type)
- Clearances Distance  $\geq 8.0\text{mm}$  (M/SLM Type)
- RoHS and REACH compliance
- Halogen Free compliance (Optional)
- MSL class 1
- Regulatory Approvals
  - ✓ UL - UL1577 (E364000)
  - ✓ VDE - EN60747-5-5(VDE0884-5)
  - ✓ CQC – GB4943.1, GB8898 (14001104781)
  - ✓ IEC62368 (FI/41119)

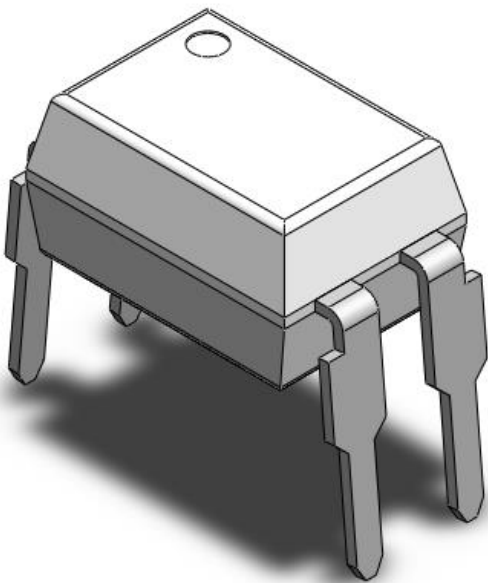
## Description

The CT816 series consists of a photo transistor optically coupled to an Infrared-emitting diode in a 4-lead DIP DMC-Isolator® package with different lead forming options.

## Applications

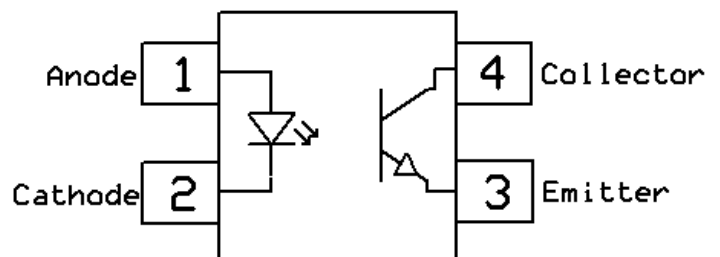
- Switch mode power supplies
- Computer peripheral interface
- Microprocessor system interface

## Package Outline



Note: Different bending options available. See package dimension

## Schematic





# CT816 Series DC Input 4-Pin DMC-Isolator® 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, 40 ~ 60% R.H.)	5000	V <sub>RMS</sub>	
T <sub>OPR</sub>	Operating temperature	-55 ~ +110	°C	
T <sub>STG</sub>	Storage temperature	-55 ~ +150	°C	
T <sub>SOL</sub>	Soldering temperature (For 10 seconds)	260	°C	
P <sub>TOT</sub>	Total power dissipation	200	mW	
<b>Emitter</b>				
I <sub>F</sub>	Forward current	60	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>	Emitter power dissipation	100	mW	
<b>Detector</b>				
P <sub>C</sub>	Power dissipation	150	mW	
B <sub>VCEO</sub>	Collector-Emitter Breakdown Voltage	80	V	
B <sub>VECO</sub>	Emitter-Collector Breakdown Voltage	6	V	
I <sub>C</sub>	Collector Current	50	mA	



# CT816 Series

## DC Input 4-Pin DMC-Isolator<sup>®</sup>

### 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	$\mu\text{A}$	
$C_{IN}$	Input Capacitance	$f = 1\text{MHz}$	-	30	-	pF	

##### Detector Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
$B_{V_{CEO}}$	Collector-Emitter Breakdown	$I_C = 100\mu\text{A}$	80	-	-	V	
$B_{V_{ECO}}$	Emitter-Collector Breakdown	$I_E = 100\mu\text{A}$	6	-	-	V	
$I_{CEO}$	Collector-Emitter Dark Current	$V_{CE} = 20\text{V}, I_F = 0\text{mA}$	-	-	100	nA	



# CT816 Series

## DC Input 4-Pin DMC-Isolator®

### Phototransistor Optocoupler

### Electrical Characteristics $T_A = 25^\circ\text{C}$ , unless otherwise specified

#### Transfer Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes	
CTR	Current Transfer Ratio	$I_F = 5\text{mA}$ , $V_{CE} = 5\text{V}$	CT816	50	-	600	%	
			CT816A	80	-	160		
			CT816B	130	-	260		
			CT816C	200	-	400		
			CT816D	300	-	600		
			CT816F	100	-	200		
			CT816Y	200	-	300		
CTR	Current Transfer Ratio	$I_F = 10\text{mA}$ , $V_{CE} = 5\text{V}$	CT816I	63	-	125	%	
			CT816J	100	-	200		
			CT816K	160	-	320		
			CT816N	40	-	80		
		$I_F = 1\text{mA}$ , $V_{CE} = 5\text{V}$	CT816I	22	-	-		
			CT816J	34	-	-		
			CT816K	56	-	-		
			CT816N	13	-	-		
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage	$I_F = 20\text{mA}$ , $I_C = 1\text{mA}$	-	0.1	0.2	V		
$R_{IO}$	Isolation Resistance	$V_{IO} = 500\text{V}_{DC}$ , 40 ~ 60% R.H.	$5 \times 10^{10}$	-	-	$\Omega$		
$C_{IO}$	Isolation Capacitance	$f = 1\text{MHz}$	-	0.25	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	18	$\mu\text{s}$	
$t_f$	Fall Time		-	8	18		



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

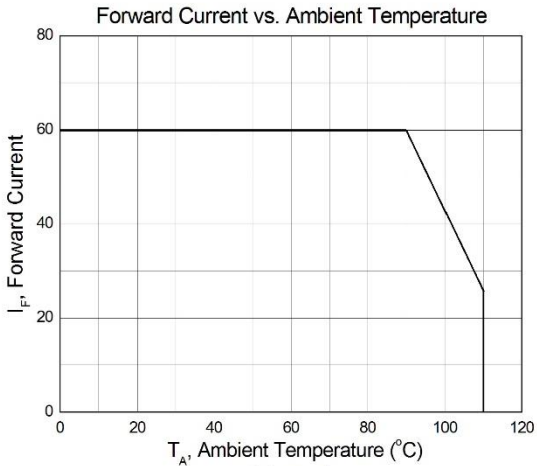


Figure 1

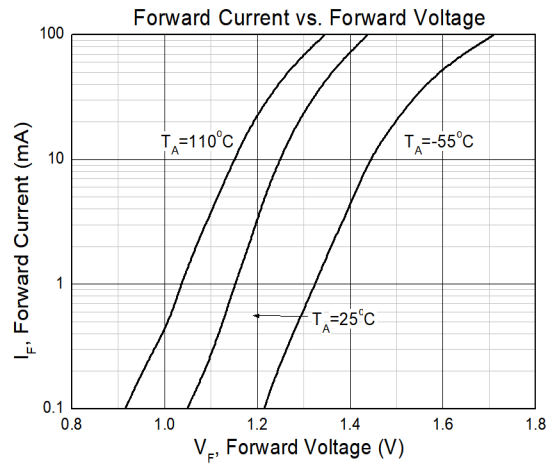


Figure 1

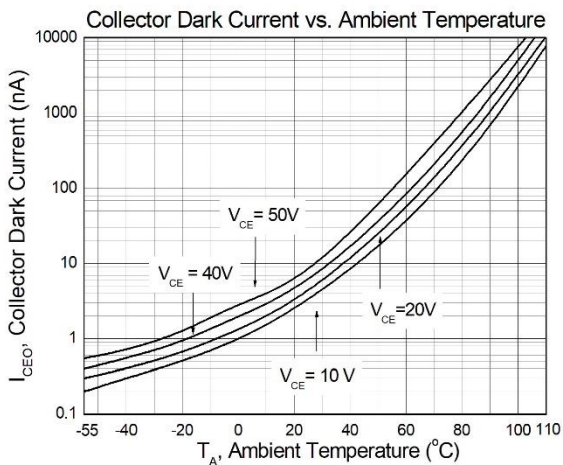


Figure 3

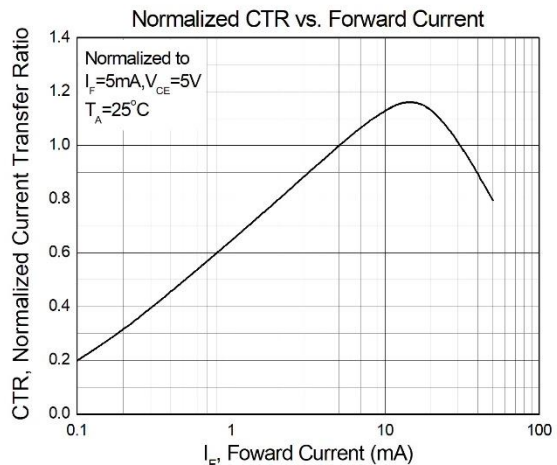


Figure 4

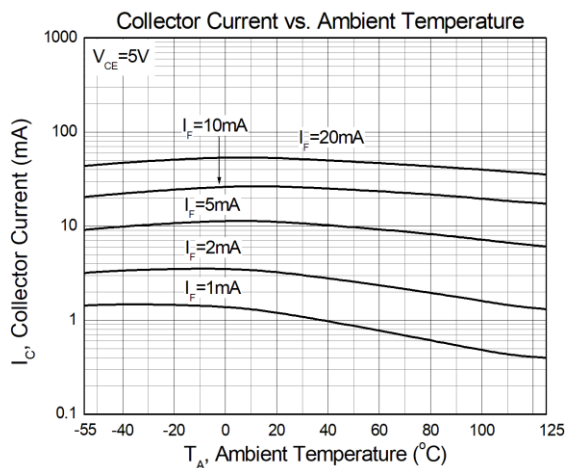


Figure 5

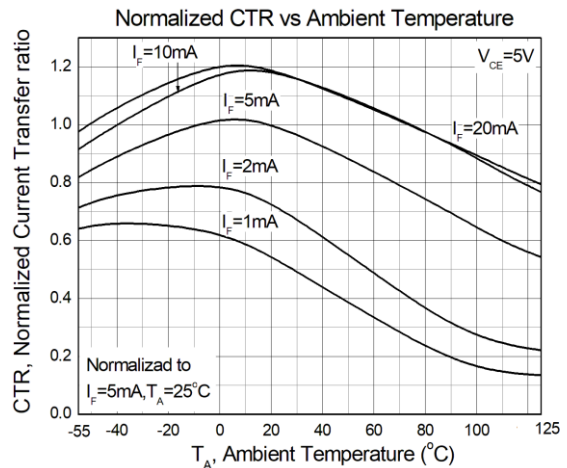


Figure 6



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

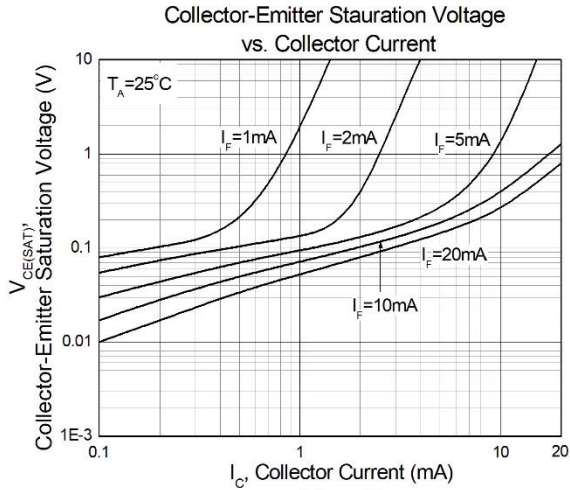


Figure 7

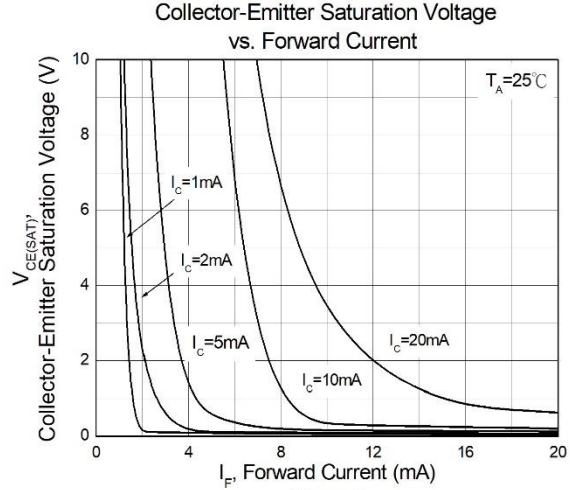


Figure 8

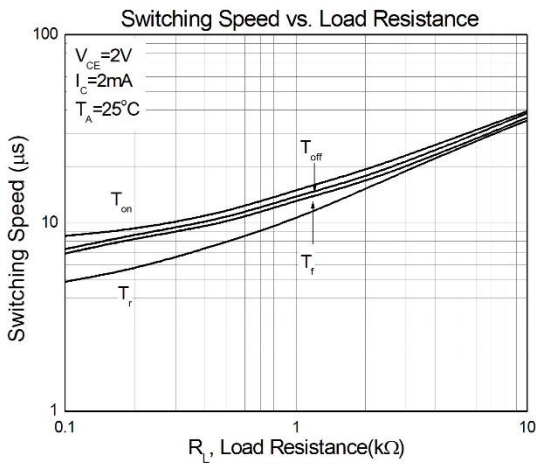


Figure 9

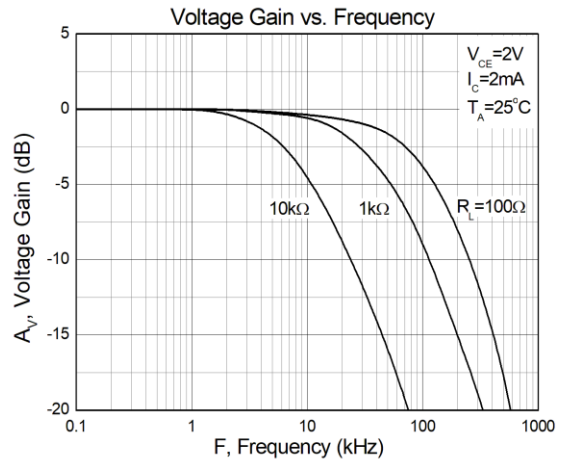


Figure 10



## Test Circuit

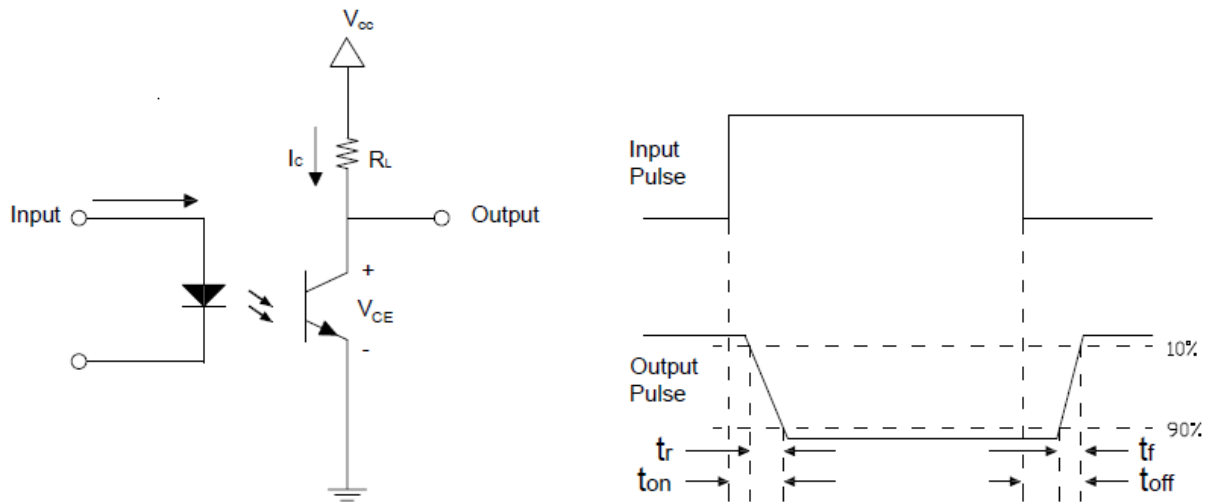
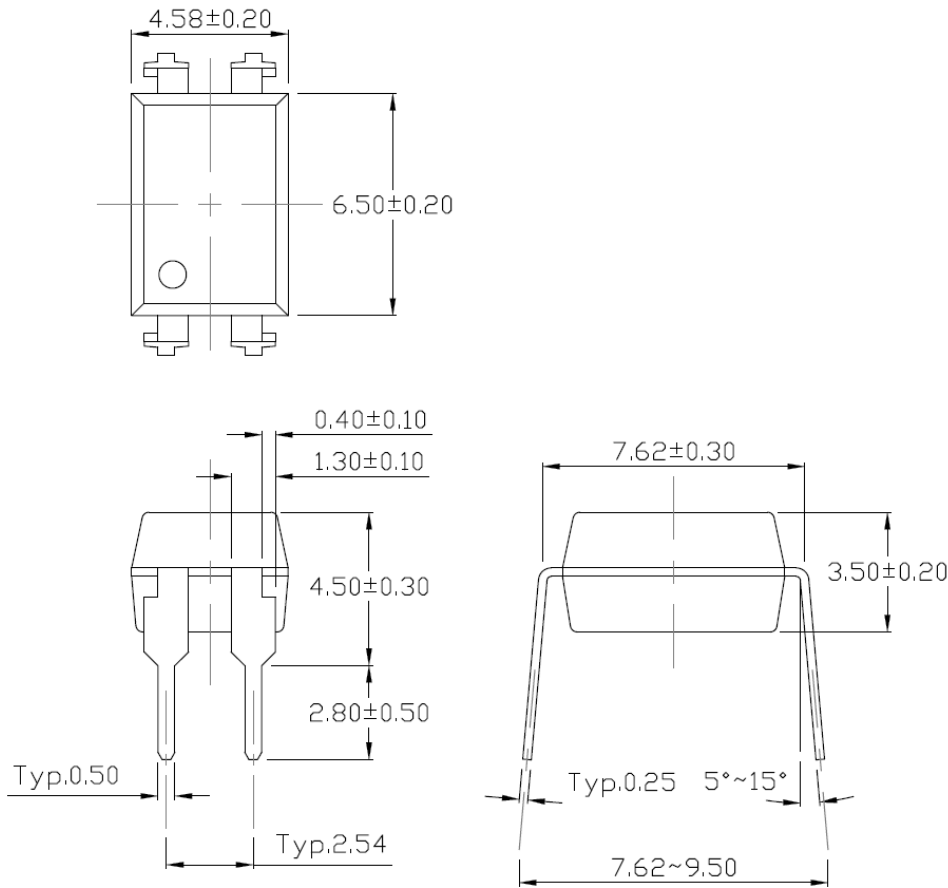


Figure 11: Switching Time Test Circuits

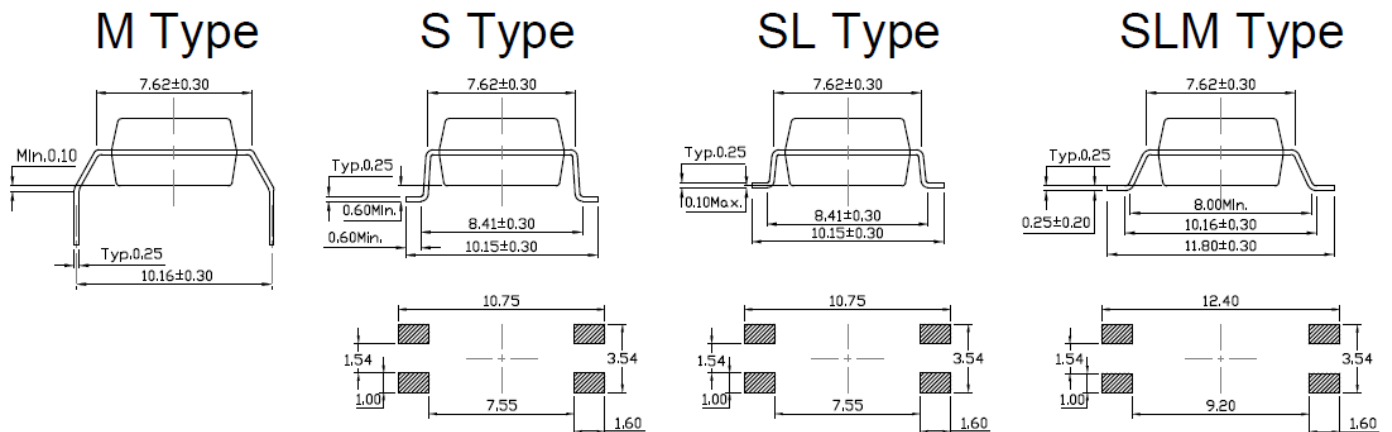


## Package Dimension *Dimensions in mm unless otherwise stated*

### Standard DIP – Through Hole



### Forming Option

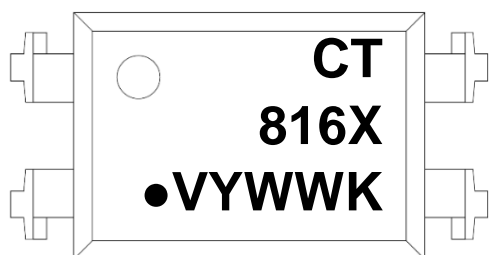






# CT816 Series DC Input 4-Pin DMC-Isolator® Phototransistor Optocoupler

## Marking Information



### Note:

- CT : Denotes “CT Micro”
- 816 : Part Number
- X : CTR Rank Option (Blank, A, B, C or D)
- V : VDE Safety Mark Option (Blank or V)
- Y : One Digit Year Code
- WW : Two Digit Work Week
- K : Manufacturing Code
- : Lead Frame Material Option  
(Blank : Iron ; • : Copper)

## Ordering Information

### CT816X (V)(Y)(Z)-HG

- CT = Denotes “CT Micro”
- 816 = Part Number
- X = CTR Rank Option (Blank, A, B, C, D, I, J, K, N, F or Y)
- V = VDE Safety Mark Option (Blank or V)
- Y = Lead Form Option (S, SL, M, SLM or Blank)
- Z = Tape and Reel Option (Blank, T1 or T2)
- H = Lead Frame Option (H: Iron, Blank: Copper)
- G = Material Option (G: Halogen Free, Blank: Non-Halogen Free)

<b>Option</b>	<b>Description</b>	<b>Quantity</b>
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
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
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

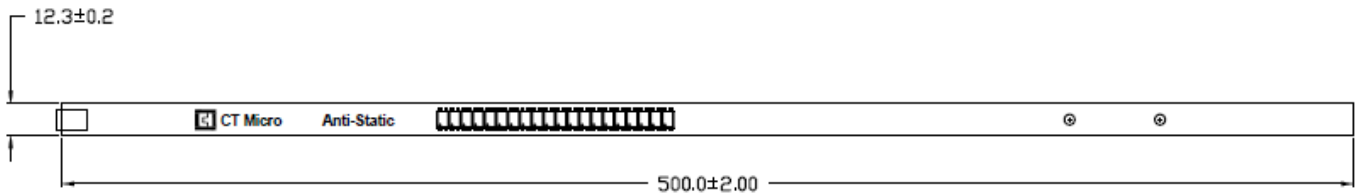


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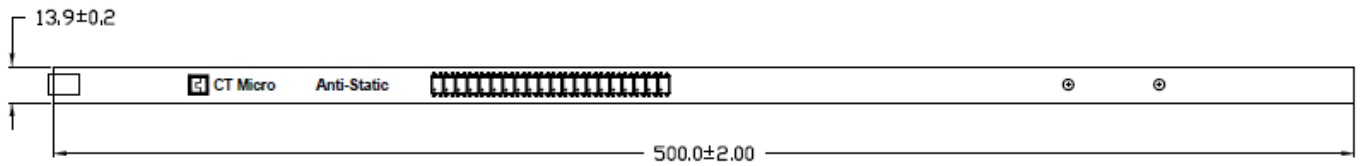
# CT816 Series DC Input 4-Pin DMC-Isolator<sup>®</sup> Phototransistor Optocoupler

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

### Tube Option Standard DIP

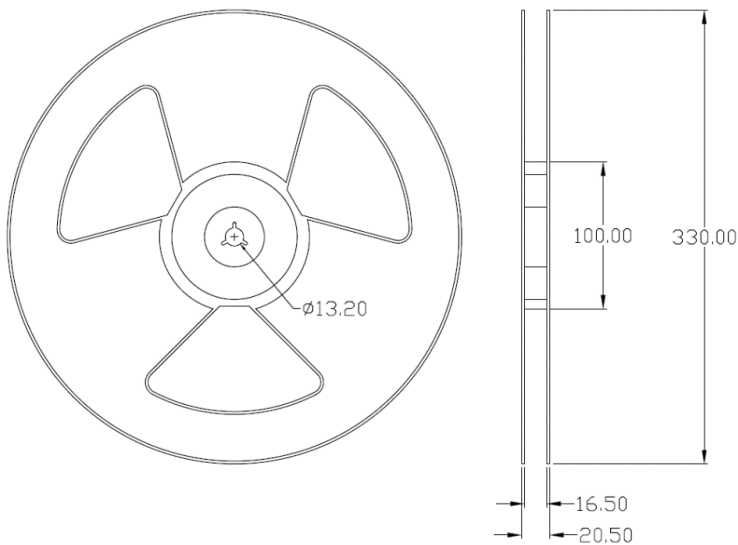


### Tube Option M Type

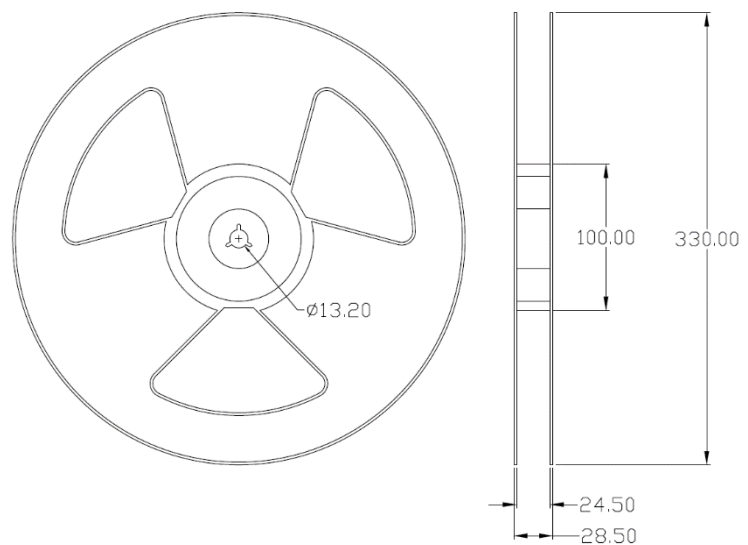


## Reel Dimension *All dimensions are in mm, unless otherwise stated*

### Option S(T1/T2) & SL(T1/T2)



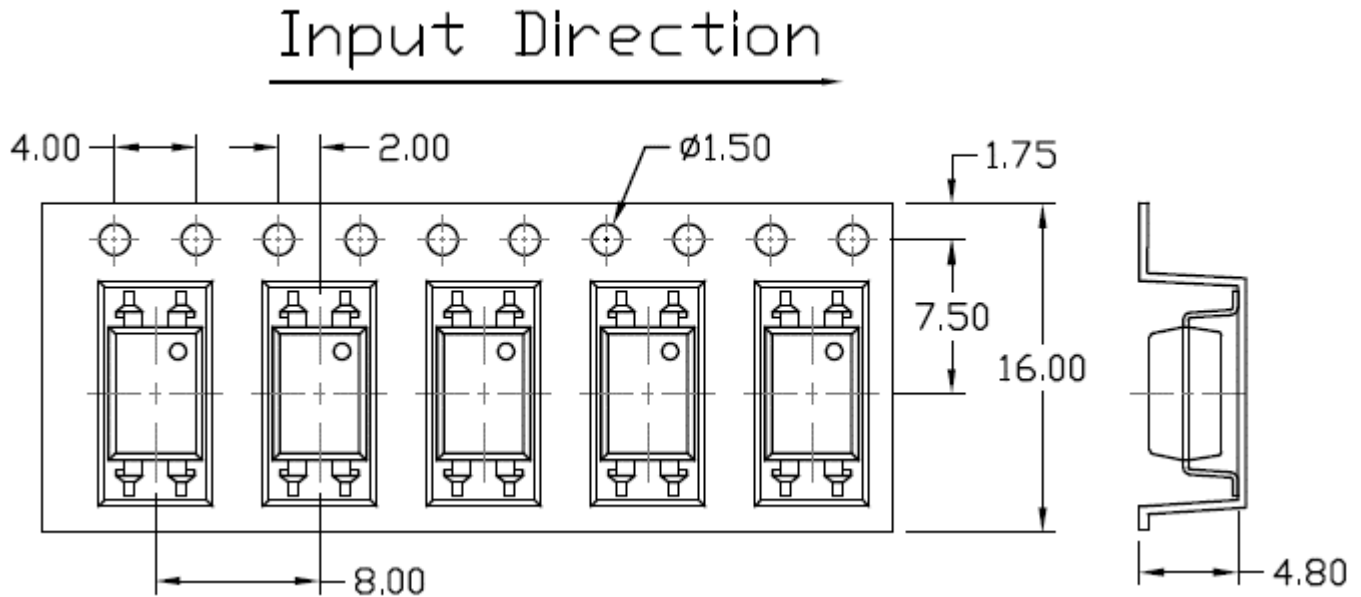
### Option SLM(T1/T2)



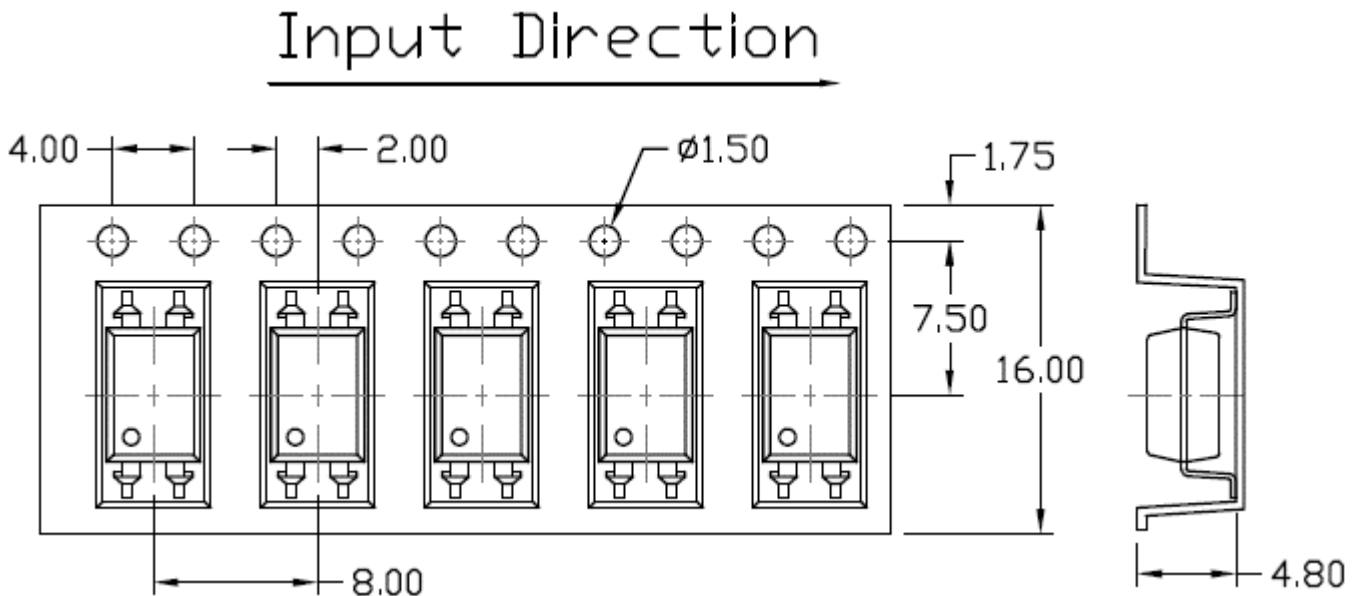


**Carrier Tape Specifications** *Dimensions in mm unless otherwise stated*

**Option S(T1) & SL(T1)**



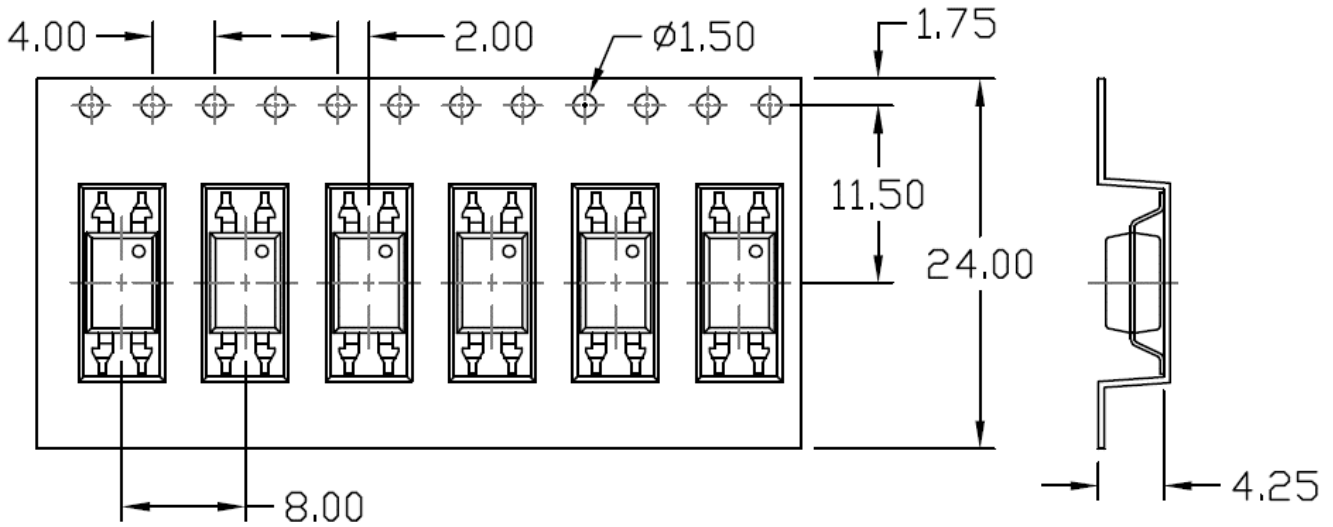
**Option S(T2) & SL(T2)**





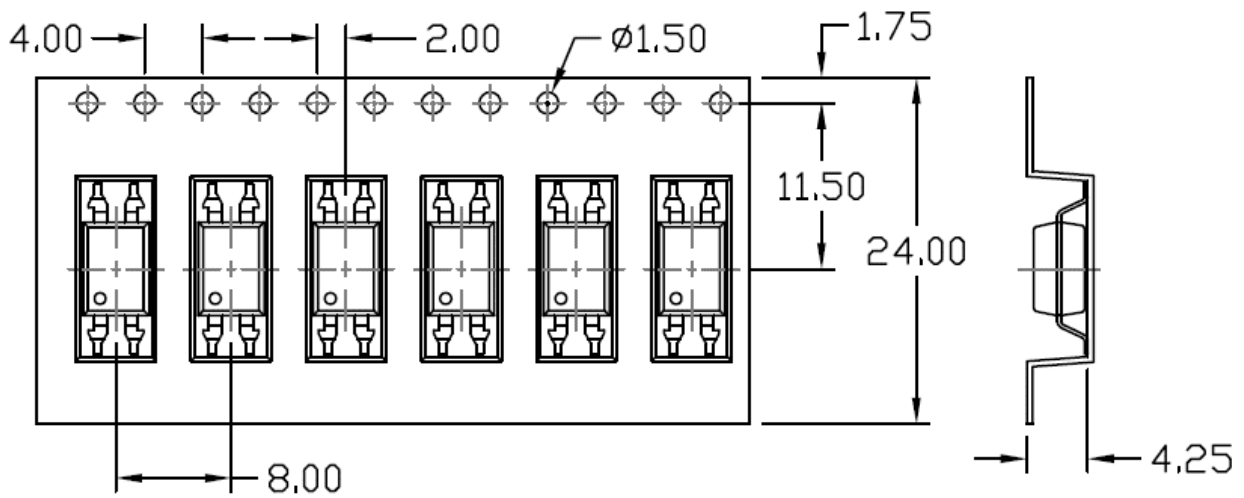
**Option SLM(T1)**

Input Direction  
→



**Option SLM(T2)**

Input Direction  
→





## 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)

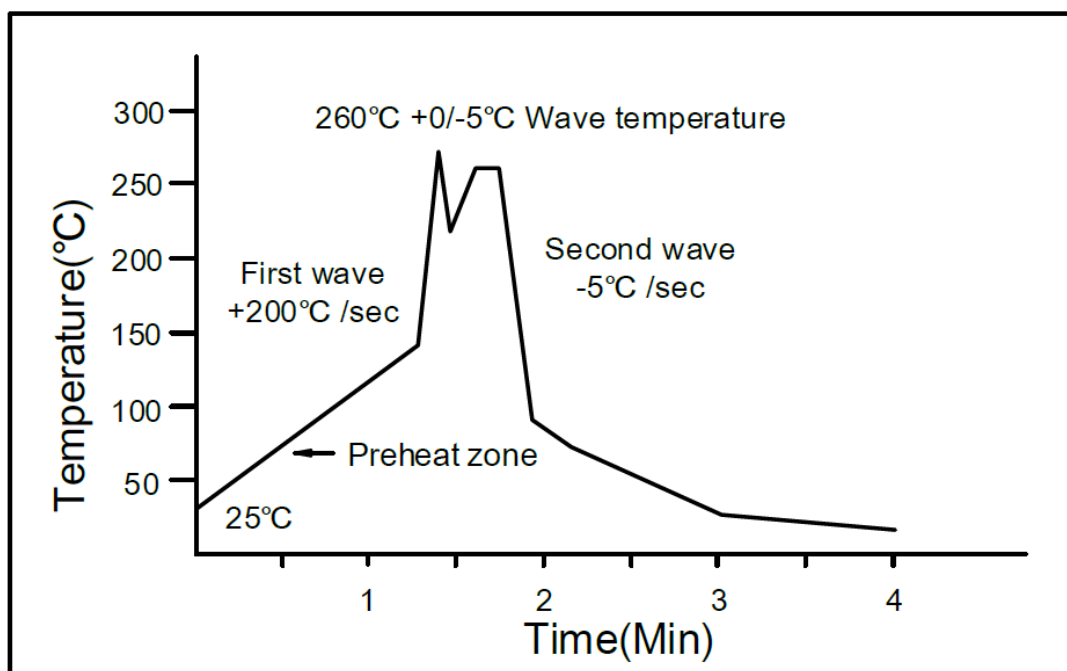
One time soldering is recommended within the condition of temperature.

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

Time: 10 sec.

Preheat temperature: 25 to  $140^\circ\text{C}$ .

Preheat time: 30 to 80 sec.



## Iron soldering (Follow the standard MIL-STD 202G, Method 210F)

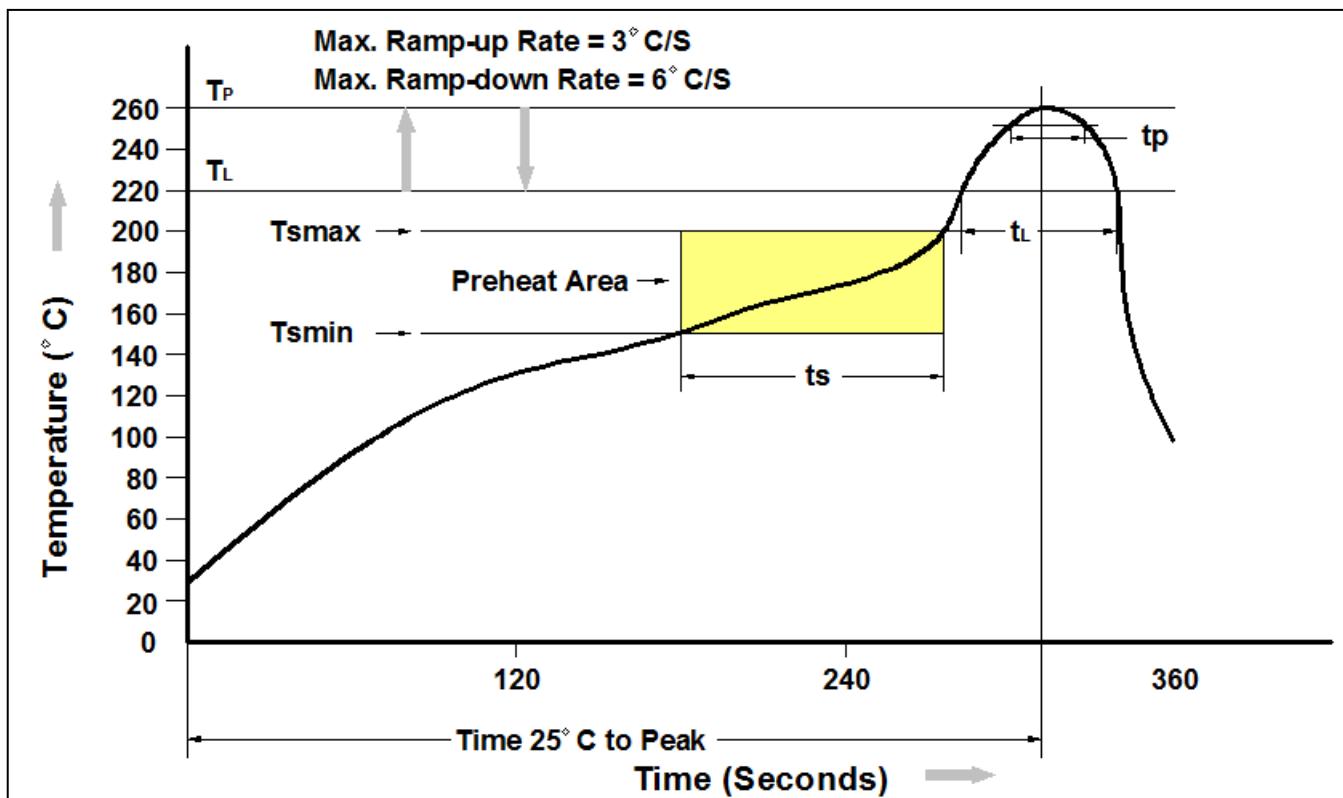
Allow single lead soldering in every single process.

One time soldering is recommended. Temperature:  $350 \pm 10^\circ\text{C}$

Time: 5 sec max.



**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.



# CT816 Series DC Input 4-Pin DMC-Isolator® Phototransistor Optocoupler

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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.*

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