www.ct-micro.com

CT816L Series

DC Low Current Input 4-Pin DMC-Isolator® Phototransistor Optocoupler

Features

- High isolation 5000 VRMS
- Patented coplanar structure DMC-Isolator®
- Various CTR selection available
- DC Low Current Input with transistor output
- Operating Temperature range - 55 °C to 110 °C
- External creepage distance ≥ 7.0mm
- Distance Through Isolation ≥ 0.4mm
- Clearances Distance ≥ 7.5mm (S/SL Type)
- Clearances Distance ≥ 8.0mm (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)

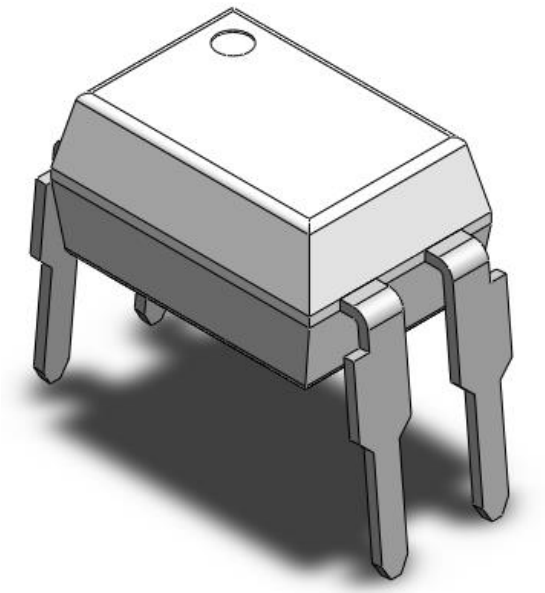
Description

The CT816L series consists of a photo transistor optically coupled to an arsenide Infrared-emitting diode in a 4-lead DMC-Isolator® package with bending options.

Applications

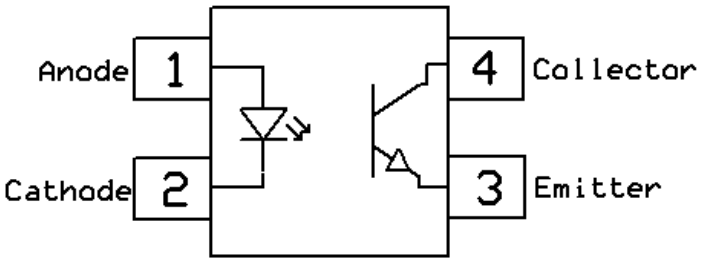
- Switch mode power supplies
- Computer peripheral interface
- Microprocessor system interface

Package Outline



Note: Different bending options available. See package dimension

Schematic



Absolute Maximum Ratings T_A = 25°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.)	5000	V_{RMS}	
T_{OPR}	Operating temperature	-55 ~ +110	°C	
T_{STG}	Storage temperature	-55 ~ +150	°C	
T_{SOL}	Soldering temperature (For 10 seconds)	260	°C	
P_{TOT}	Total power dissipation	200	mW	
Emitter				
I_F	Forward current	60	mA	
$I_{F(TRANS)}$	Peak transient current (≤1μs P.W,300pps)	1	A	
V_R	Reverse voltage	6	V	
P_D	Emitter power dissipation	100	mW	
Detector				
P_C	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°C, unless otherwise specified*

Emitter Characteristics

Symbol	*Parameters*	*Test Conditions*	*Min*	*Typ*	*Max*	*Units*	*Notes*
V_F	Forward voltage	I_F=10mA	-	1.3	1.4	V	
I_R	Reverse Current	V_R = 6V	-	-	5	μA	
C_{IN}	Input Capacitance	f= 1MHz	-	15	-	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	7	-	-	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	CT816L2	I_F= 1mA, V_{CE}= 0.5V	63	-	125	%	
		CT816L3		100	-	200		
		CT816L4		160	-	320		
		CT816L5		250	-	500		
CTR	Current Transfer Ratio	CT816L2	I_F= 0.5mA, V_{CE}= 1.5V	32	75	-	%	
		CT816L3		50	120	-		
		CT816L4		80	200	-		
		CT816L5		125	300	-		
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage	CT816L2	I_F= 1mA, I_C= 0.32mA	-	0.2	0.4	V	
		CT816L3	I_F= 1mA, I_C= 0.50mA	-	0.2	0.4		
		CT816L4	I_F= 1mA, I_C= 0.80mA	-	0.2	0.4		
		CT816L5	I_F= 1mA, I_C= 1.25mA	-	0.2	0.4		
R_{IO}	Isolation Resistance		V_{IO}= 500V_{DC}	$5x10^{10}$	-	-	Ω	
C_{IO}	Isolation Capacitance		f= 1MHz	-	0.25	1	pF	

Switching Characteristics *T_A = 25°C, unless otherwise specified*

Symbol	*Parameters*	*Test Conditions*	*Min*	*Typ*	*Max*	*Units*	*Notes*
t_r	Rise Time	I_C= 2mA, V_{CE}= 2V, R_L= 100Ω	-	4.9	-	μs	
t_f	Fall Time		-	6.5	-		
t_{on}	Turn-on Time		-	8.6	-		
t_{off}	Turn-off Time		-	6.9	-		

Typical Characteristic Curves *T_A = 25°C, unless otherwise specified*

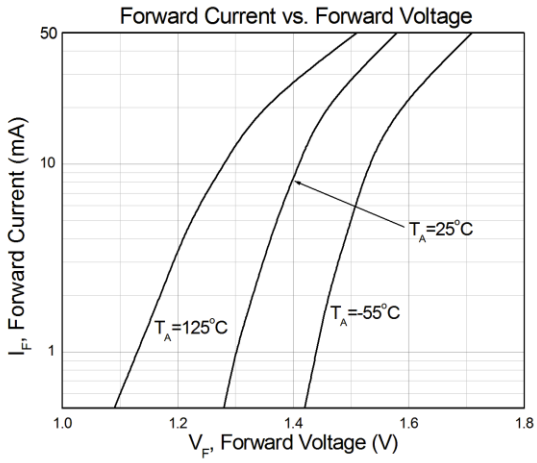


Figure 1

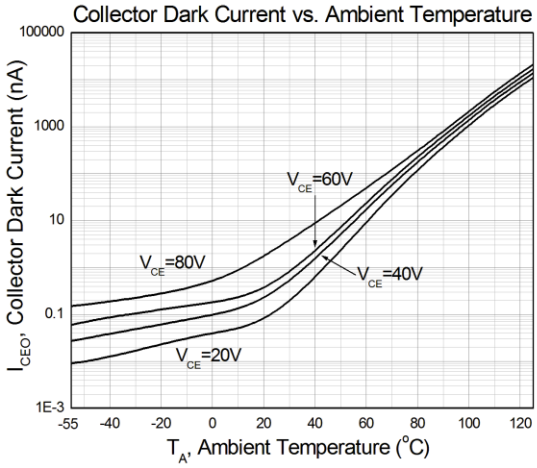


Figure 2

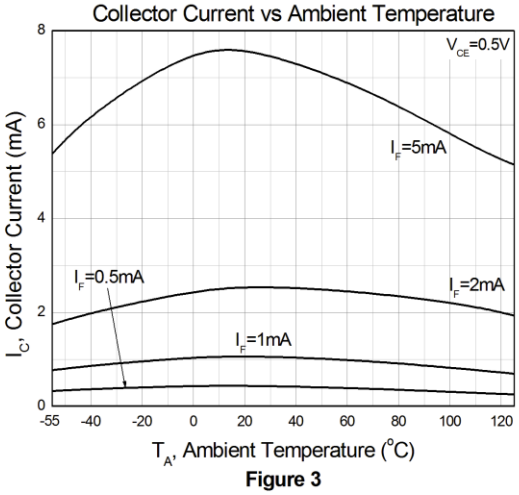


Figure 3

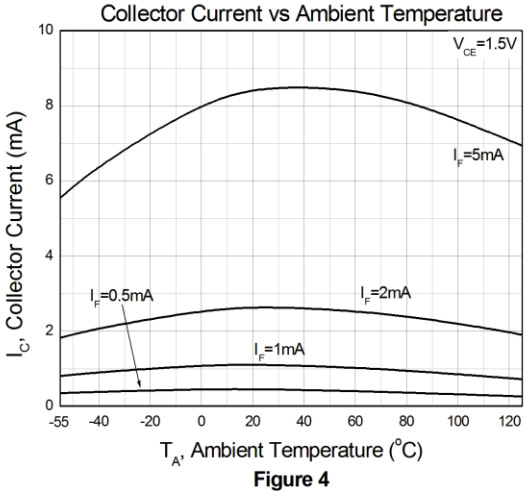


Figure 4

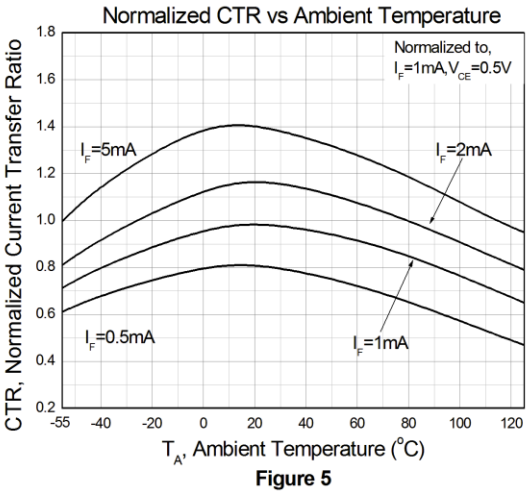


Figure 5

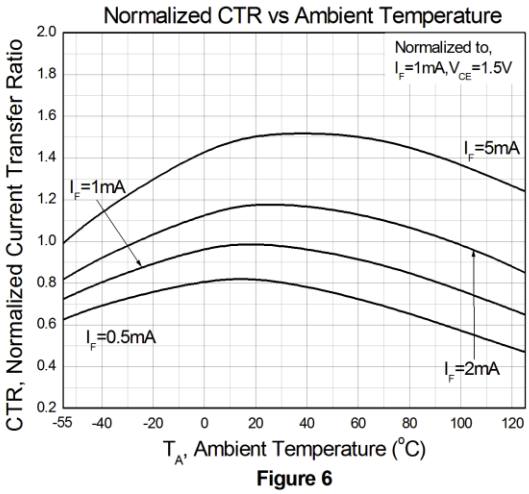


Figure 6

Typical Characteristic Curves *T_A = 25°C, unless otherwise specified*

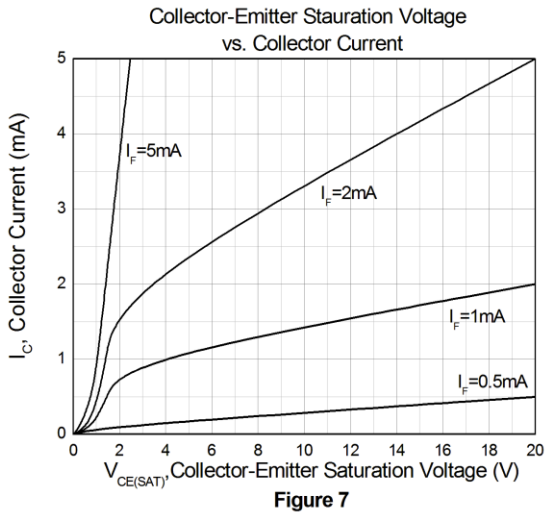


Figure 7

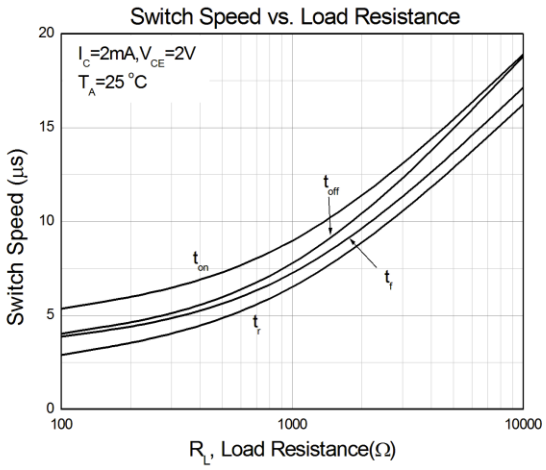


Figure 8

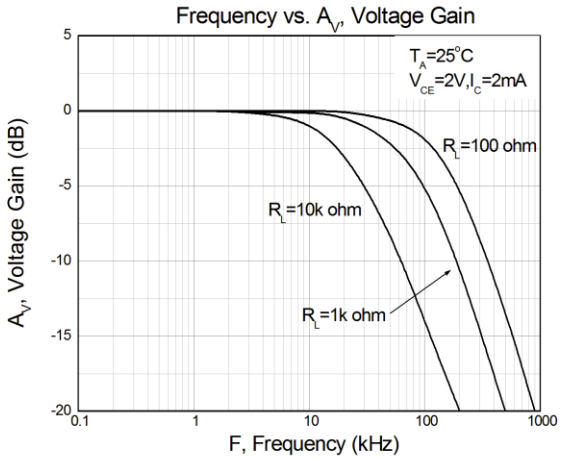


Figure 9

Test Circuit

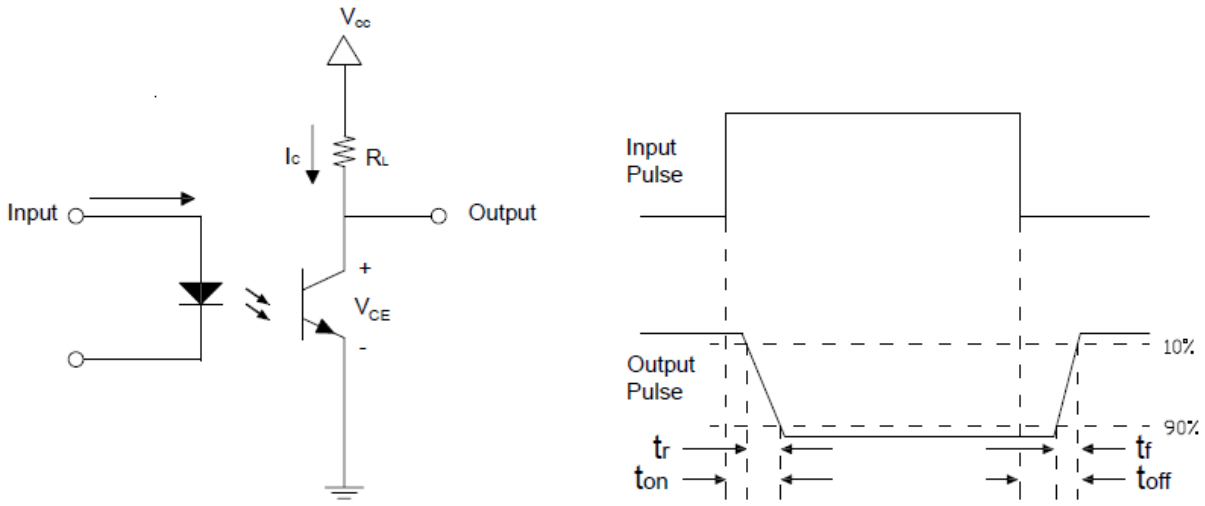
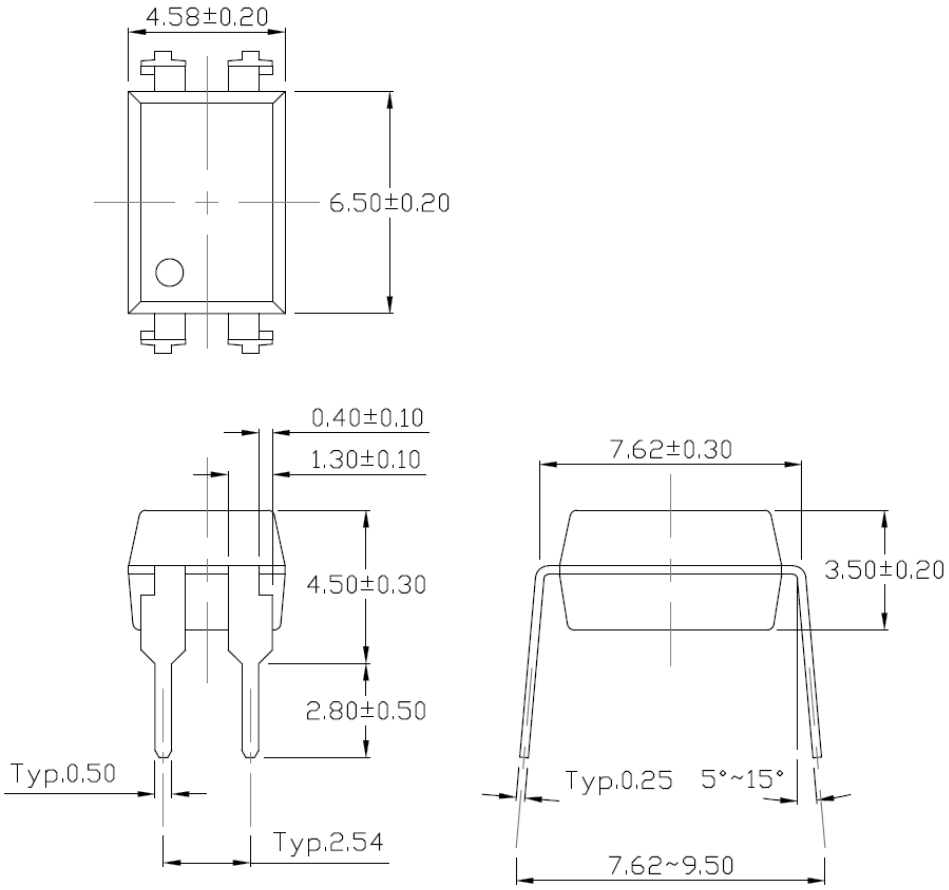


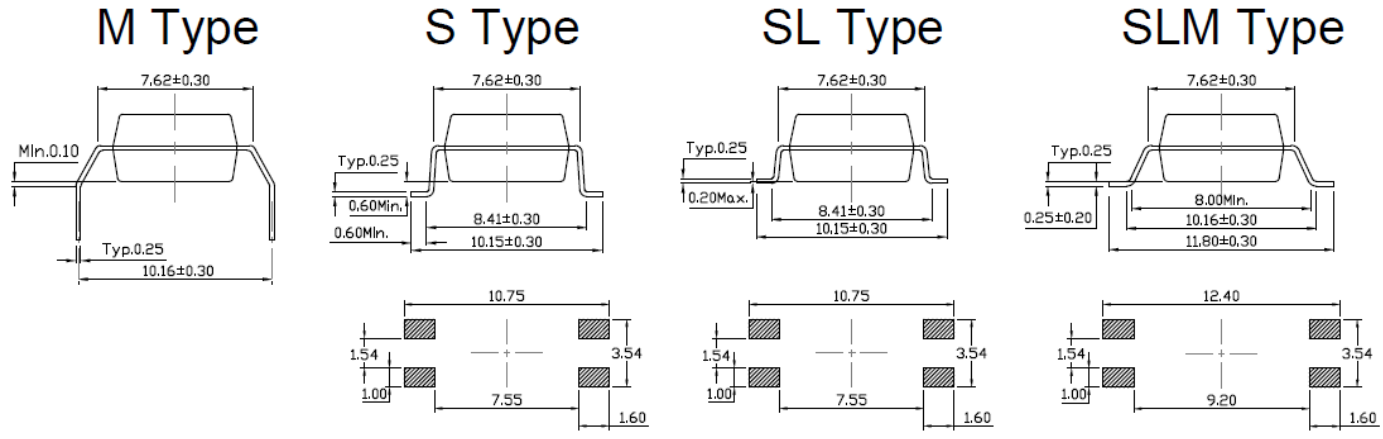
Figure 10: Switching Time Test Circuits

Package Dimension *Dimensions in mm unless otherwise stated*

Standard DIP – Through Hole



Forming Option *Dimensions in mm unless otherwise stated*



Marking Information

CT : Denotes “CT Micro”
816L : Part Number
X : CTR Rank
V : VDE Safety Mark Option (Blank or V)
Y : One Digit Year Code
WW : Two Digit Work Week
K : Manufacturing Code

Note:

Ordering Information

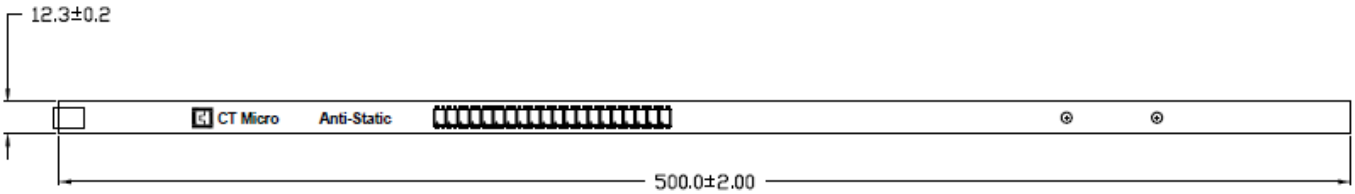
CT816LX(V)(Y)(Z)-HG

CT = Denotes “CT Micro”
816L = 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)

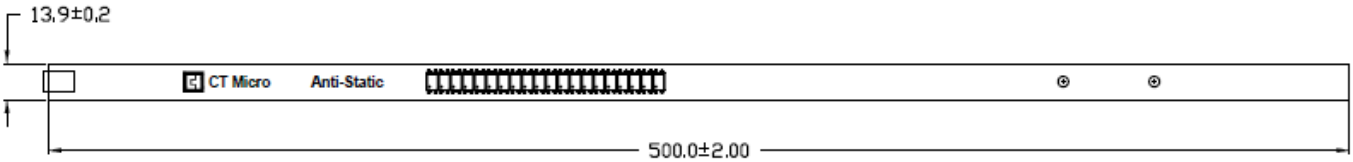
Option	***Description***	***Quantity***
None	Standard 4 Pin DIP	100 Units/Tube
M	Gullwing (400mil) Lead Forming	100 Units/Tube
S(T1)	Surface Mount Lead Forming – With Option 1 Taping	1500 Units/Reel
S(T2)	Surface Mount Lead Forming – With Option 2 Taping	1500 Units/Reel
SL(T1)	Surface Mount (Low Profile)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

Carrier Specifications *Dimensions in mm unless otherwise stated*

Tube Option Standard DIP

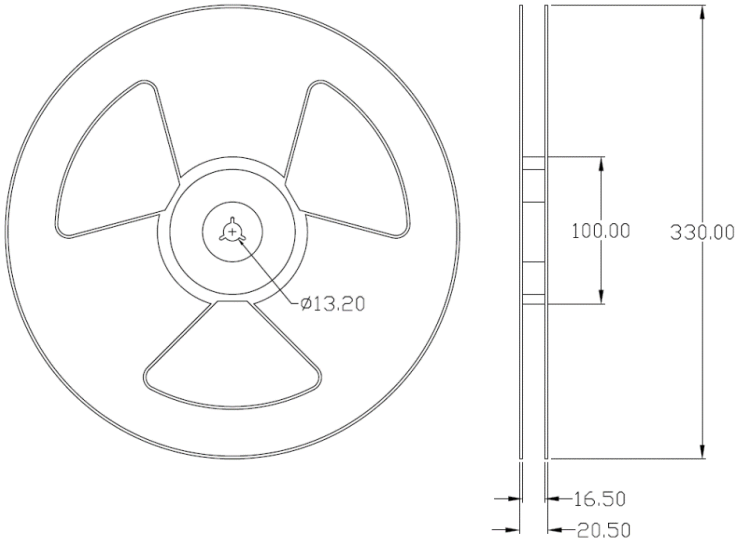


Tube Option M Type

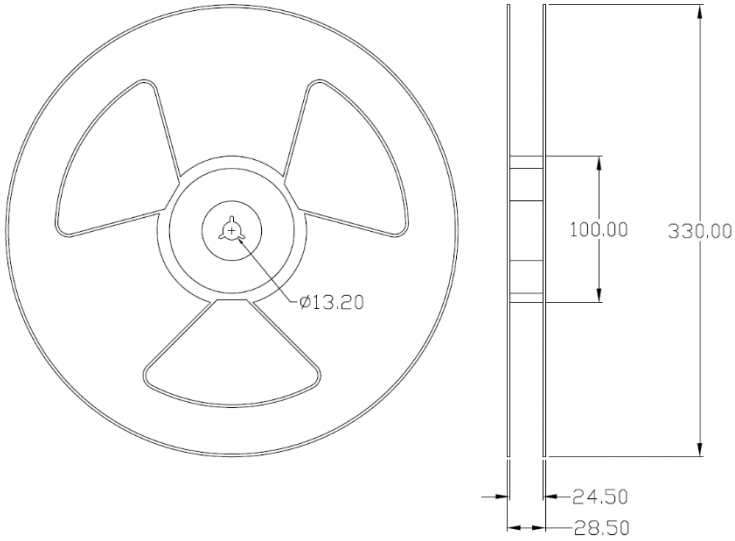


Reel Dimension *All dimensions are in mm, unless otherwise stated*

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

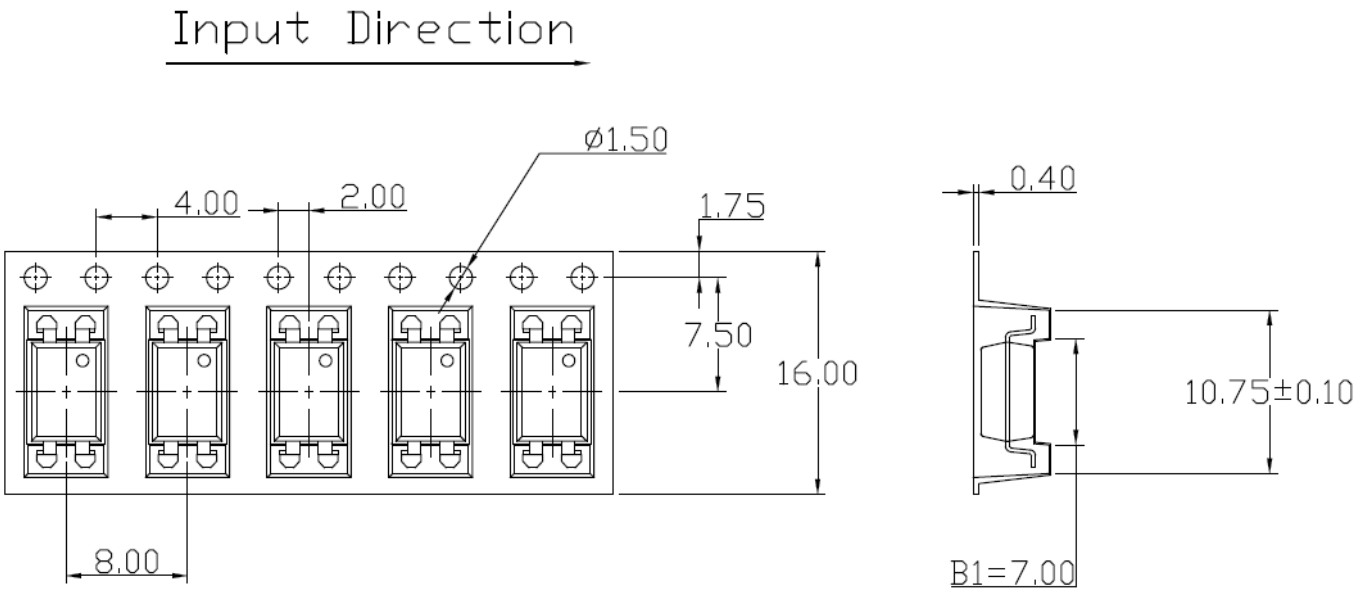


Option SLM(T1/T2)

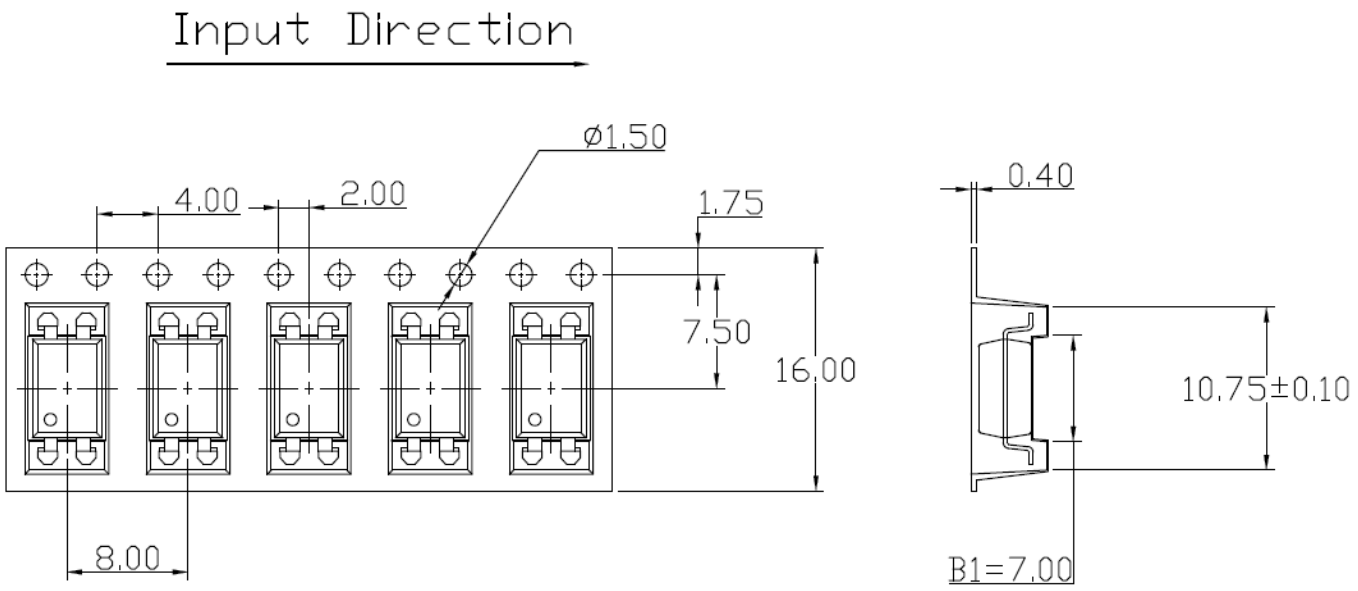


Carrier Tape Specifications *Dimensions in mm unless otherwise stated*

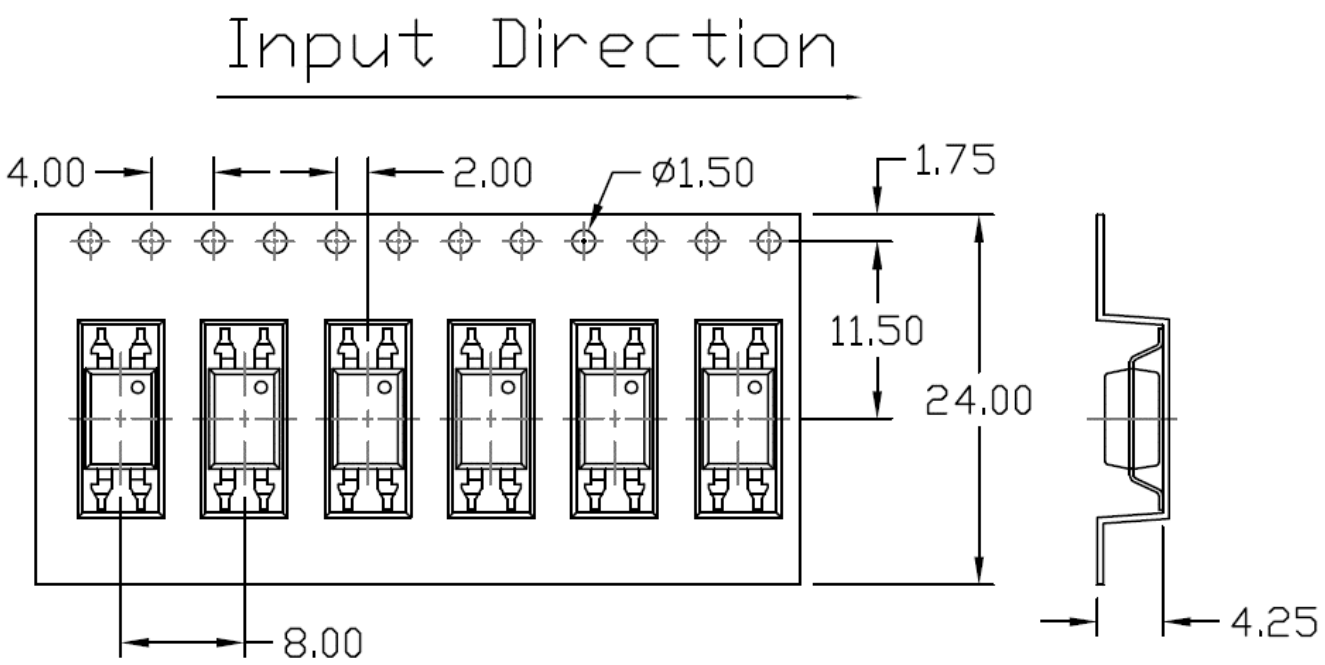
Option S(T1) & SL(T1)



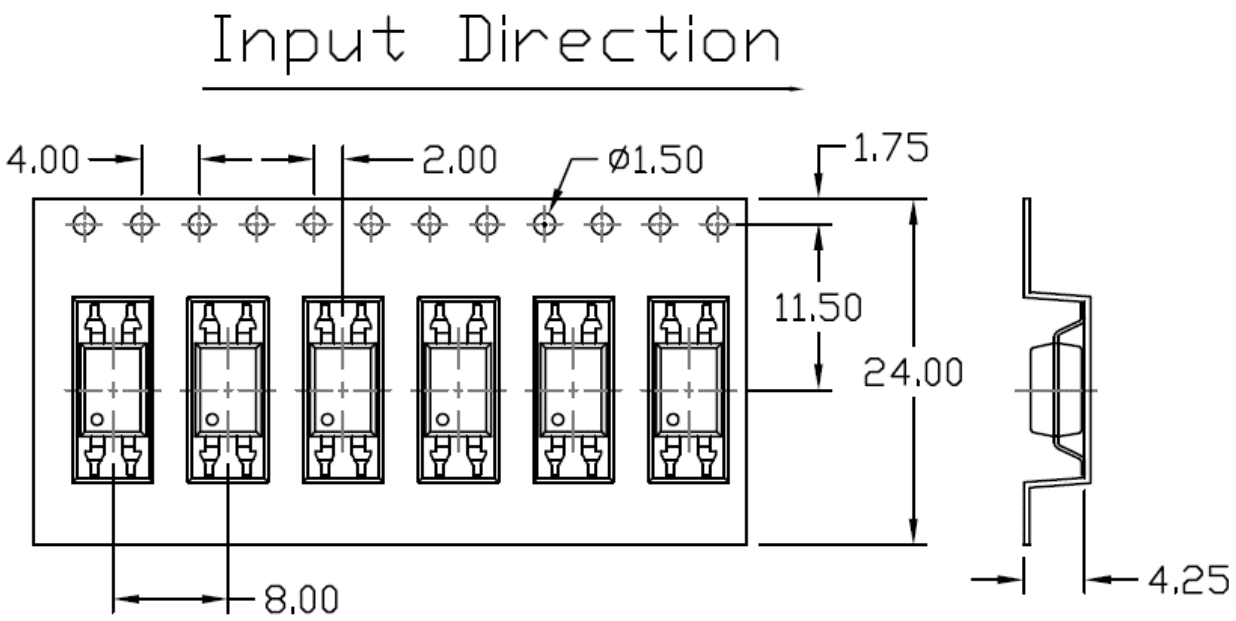
Option S(T2) & SL(T2)



Option SLM(T1)



Option SLM(T2)



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)

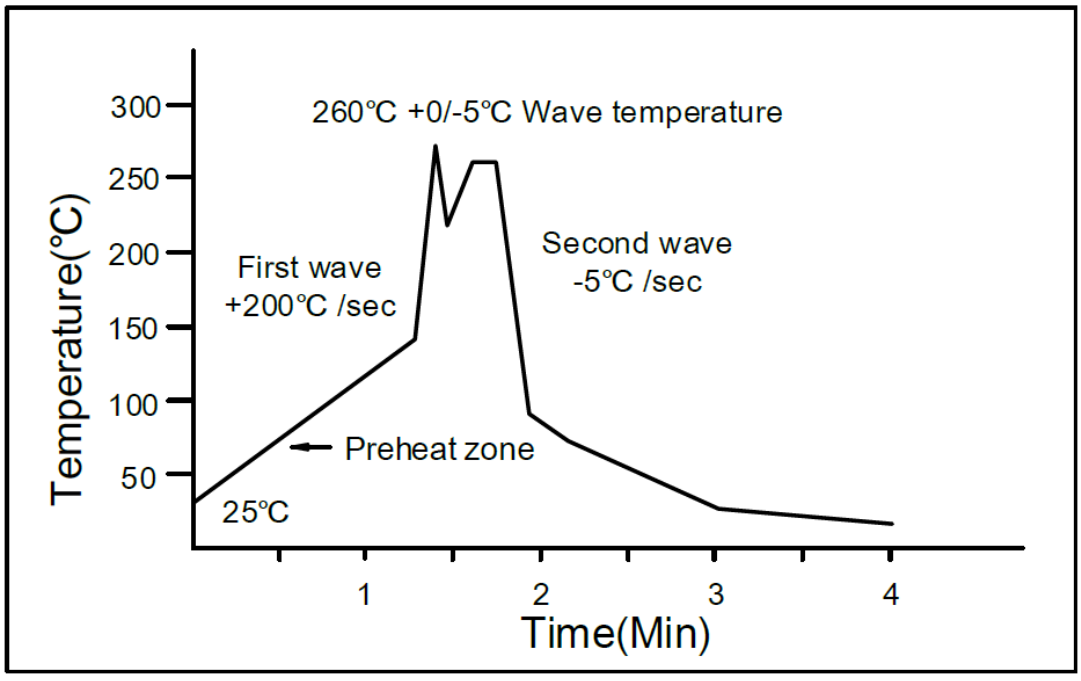
One time soldering is recommended within the condition of temperature.

Temperature: 260+0/-5˚C.

Time: 10 sec.

Preheat temperature: 25 to 140˚C.

Preheat time: 30 to 80 sec.



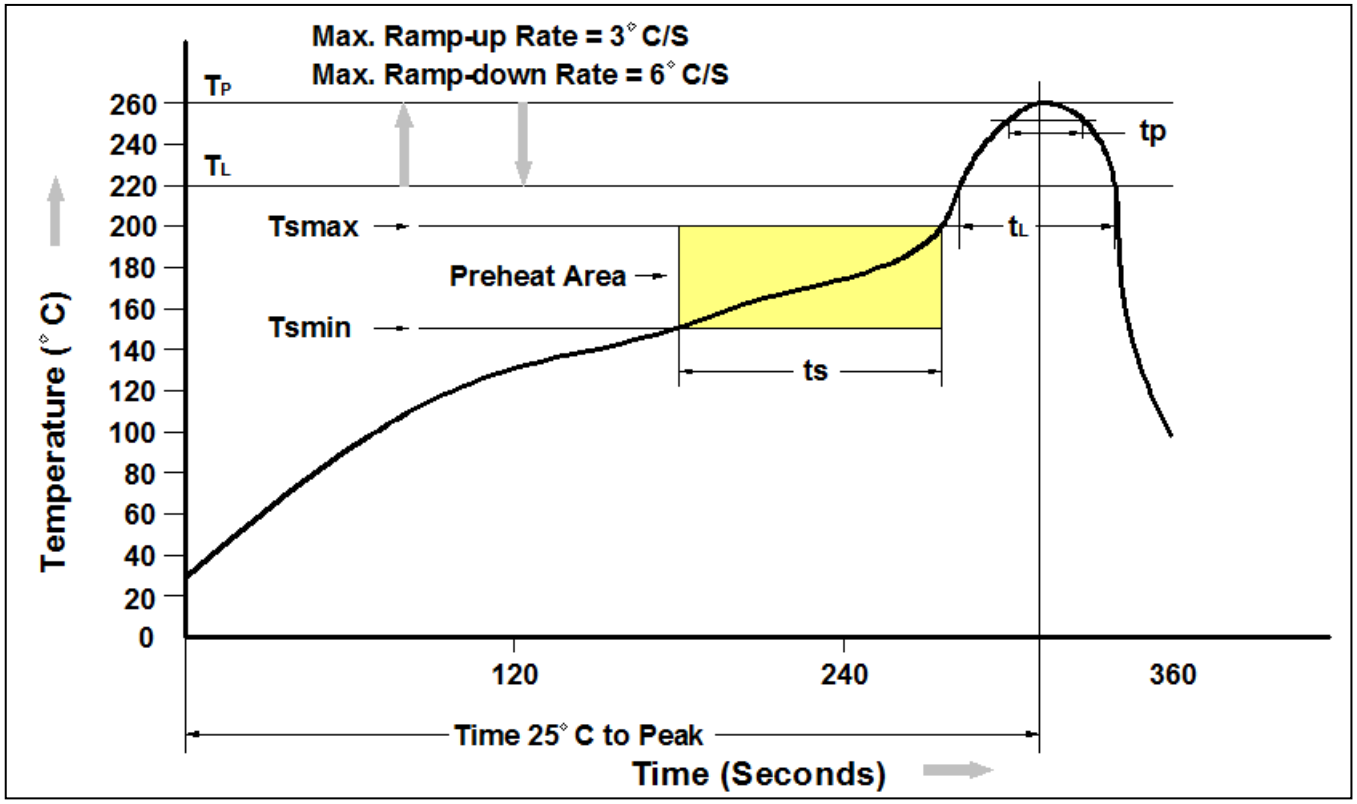
Iron soldering (Follow the standard MIL-STD 202G, Method 210F)

Allow single lead soldering in every single process.

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

Time: 5 sec max.

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



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.

DISCLAIMER

DMC-Isolator® IS A TRADEMARK OF CT MICRO INTERNATIONAL CORPORATION AND/OR ITS SUBSIDIARIES. CT MICRO OWNS THE RIGHTS TO A NUMBER OF PATENTS, TRADEMARKS, COPYRIGHTS AND OTHER INTELLECTUAL PROPERTY.

CT MICRO RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. CT MICRO DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

DISCOLORATION MIGHT OCCUR ON THE PACKAGE SURFACE AFTER SOLDERING, REFLOW OR LONG TERM USE. THIS DOES NOT IMPACT THE PRODUCT PERFORMANCE NOR THE PRODUCT RELIABILITY.

CT MICRO ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT EXPRESS WRITTEN APPROVAL OF CT MICRO INTERNATIONAL CORPORATION.

1. *Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instruction for use provided in the labelling, can be reasonably expected to result in significant injury to the user.*
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.*