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**CT3010-5L, CT3011-5L, CT3012-5L  
CT3020-5L, CT3021-5L, CT3022-5L, CT3023-5L  
250V/400V Random Phase 5-Pin DMC-Isolator®  
Phototriac Optocoupler**

## Features

- High isolation 5000 VRMS
- Patented coplanar structure DMC-Isolator®
- Peak Breakdown Voltage
  - 250V – CT3010-5L, CT3011-5L, CT3012-5L
  - 400V – CT3020-5L, CT3021-5L, CT3022-5L, CT3023-5L
- Operating Temperature range - 55 °C to 100 °C
- External Creepage  $\geq 7.4\text{mm}$
- Distance Through Isolation  $\geq 0.4\text{mm}$
- Clearance Distance  $\geq 7.5\text{mm}$  ( S/SL Type)
- Clearance Distance  $\geq 8.0\text{mm}$  ( M Type)
- RoHS and REACH Compliance
- Halogen Free Compliance (Optional)
- MSL class 1
- Regulatory Approvals
  - ✓ UL - UL1577 (E364000)
  - ✓ VDE - EN60747-5-5 (40039590)
  - ✓ CQC – GB4943.1, GB8898 (14001105802)
  - ✓ IEC62368 (FI/41119)

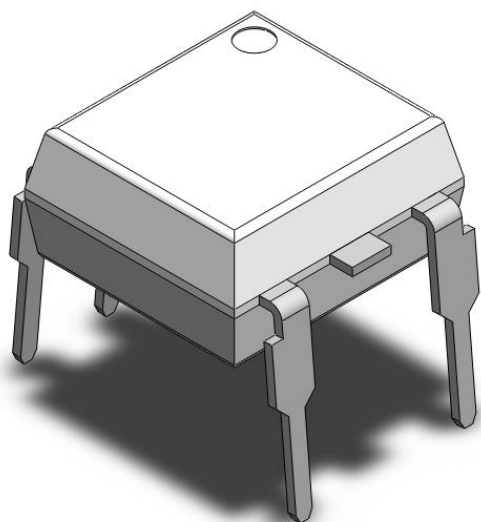
## Description

The CT3010-5L, CT3011-5L, CT3012-5L, CT3020-5L, CT3021-5L, CT3022-5L and CT3023-5L consists of a Random Phase Photo Triac optically coupled to an Infrared-emitting diode in a 5-lead DIP package DMC-Isolator® with different lead forming options.

## Applications

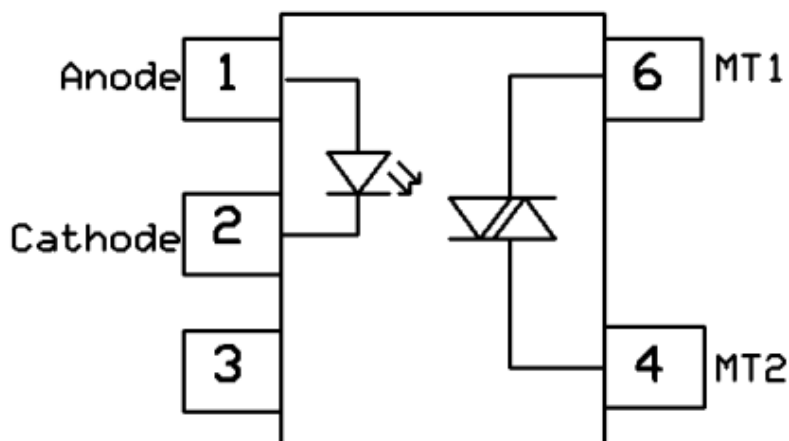
- Motor Controls
- Lamp ballasts
- Static AC Power Switch
- Solenoid/ Valve Control

## Package Outline



*Note: Different lead forming options available. See package dimension.*

## Schematic





**CT3010-5L, CT3011-5L, CT3012-5L**  
**CT3020-5L, CT3021-5L, CT3022-5L, CT3023-5L**  
**250V/400V Random Phase 5-Pin DMC-Isolator®**  
**Phototriac 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 ~ +100	°C	
T <sub>STG</sub>	Storage temperature		-55 ~ +150	°C	
T <sub>SOL</sub>	Soldering temperature (For 10 seconds)		260	°C	
T <sub>J</sub>	Junction temperature		115	°C	
Emitter					
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>	Power dissipation		100	mW	
Detector					
P <sub>D</sub>	Power dissipation		300	mW	
V <sub>DRM</sub>	Off-State Output Terminal	CT3010-5L,3012-5L,3022-5L	250	V	
	Voltage	CT3020-5L,3021-5L,3022-5L,3023-5L	400	V	
I <sub>TM</sub>	RMS on-state current		100	mA	
I <sub>TSM</sub>	Peak Repetitive Surge Current		1	A	



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## 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	1.5	V	
$I_R$	Reverse Current	$V_R = 6\text{V}$	-	-	5	$\mu\text{A}$	
$C_{IN}$	Input Capacitance	$f = 1\text{MHz}$	-	45	-	pF	

### Detector Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
$I_{DRM}$	Peak Blocking Current	$I_F = 0\text{mA}$ , $V_{DRM} = \text{Rated } V_{DRM}$	-	-	100	nA	
$V_{TM}$	Peak On-State Voltage	$I_F = \text{Rated } I_{FT}$ , $I_{TM} = 100\text{mA}$	-	-	2.5	V	
dv/dt	Critical Rate of Rise off-State Voltage	$V_{PEAK} = \text{Rated } V_{DRM}$	-	100	-	V/ $\mu\text{s}$	

### Transfer Characteristics

Symbol	Parameters		Test Conditions	Min	Typ	Max	Units	Notes
$I_{FT}$	Input Trigger Current	CT3020-5L	Terminal Voltage = 3V $I_{TM} = 100\text{mA}$	-	-	30	mA	
		CT3010-5L, CT3021-5L		-	-	15		
		CT3011-5L, CT3022-5L		-	-	10		
$I_H$	Holding Current		Terminal Voltage from "ON" to "OFF" "ON" state $I_F = 0\text{mA}$	-	250	-	$\mu\text{A}$	
$R_{IO}$	Isolation Resistance		$V_{IO} = 500\text{V}_{DC}$ , 40 ~ 60% R.H.	$1 \times 10^{11}$	-	-	$\Omega$	
$C_{IO}$	Isolation Capacitance		$f = 1\text{MHz}$	-	0.25	-	pF	



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

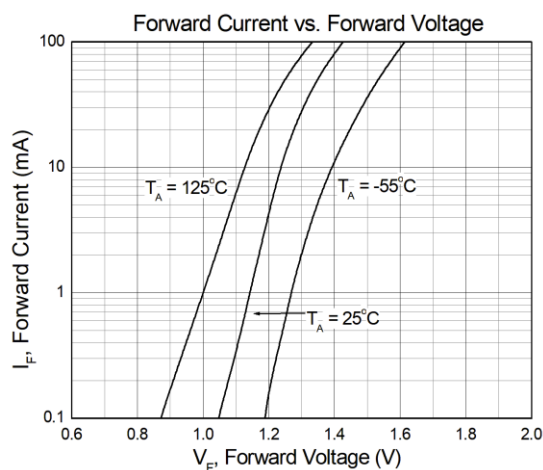


Figure 1

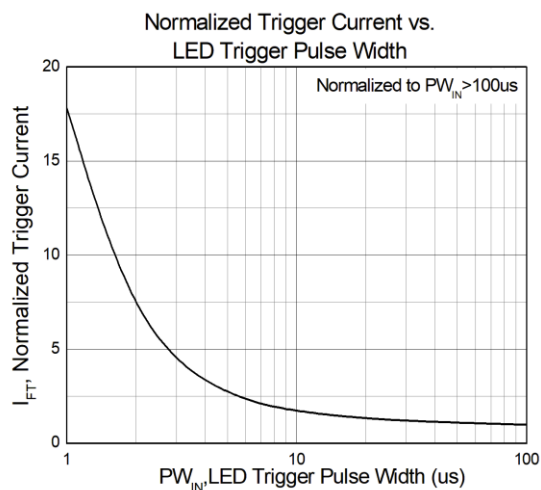


Figure 2

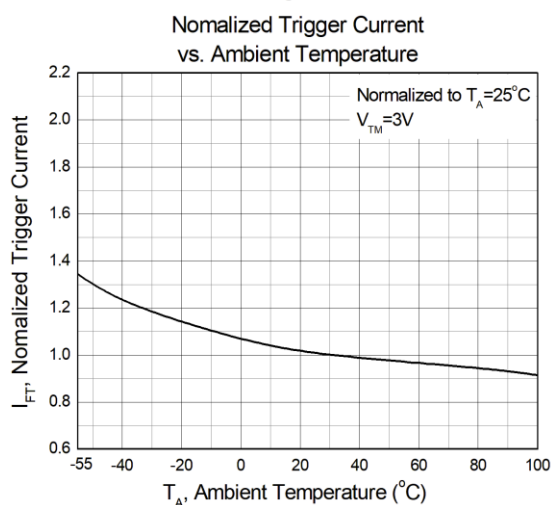


Figure 3

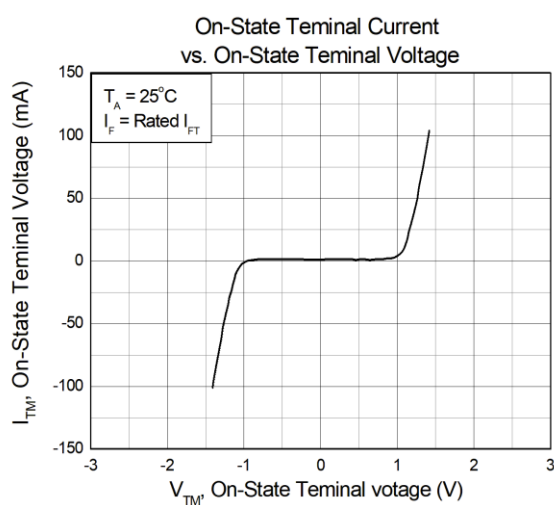


Figure 4

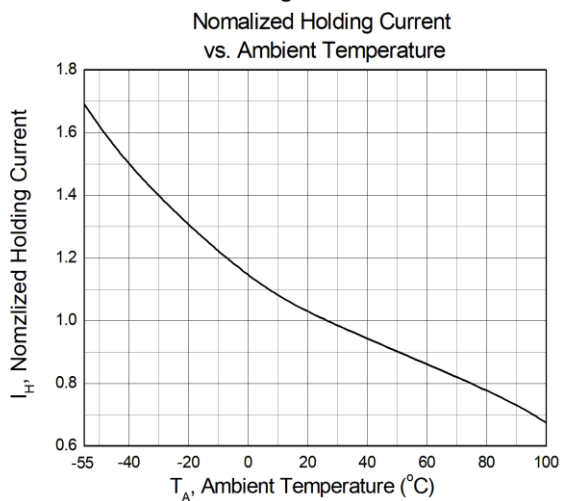


Figure 5

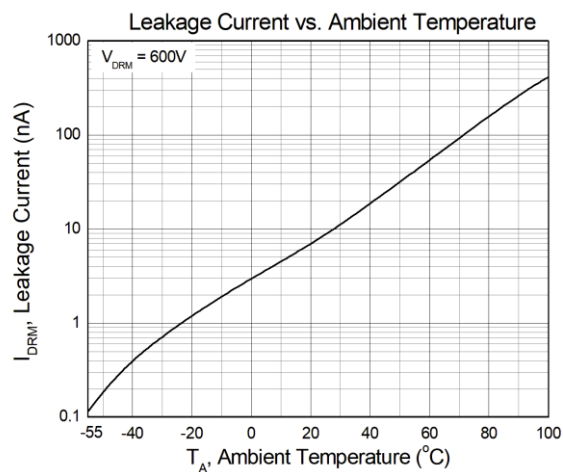
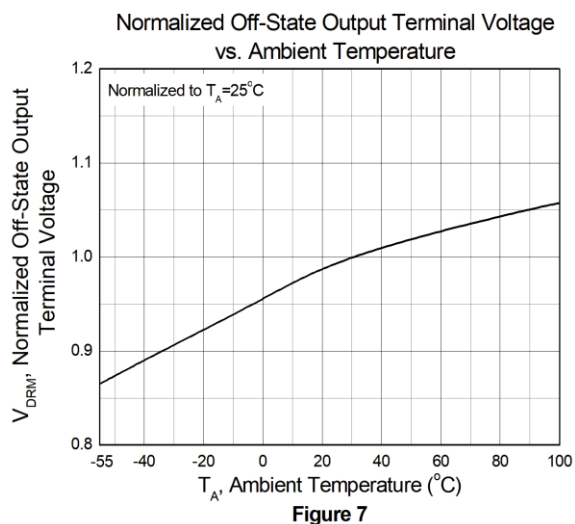


Figure 6



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

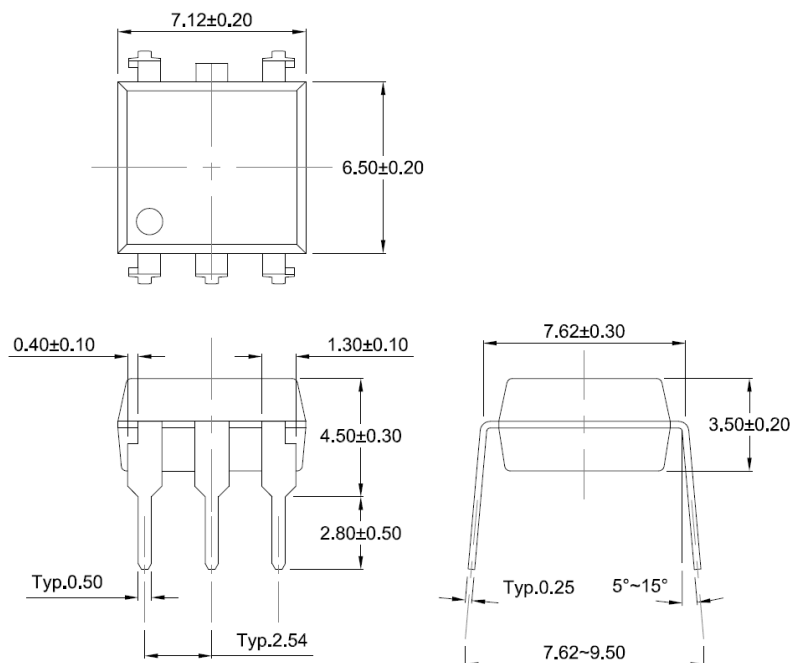




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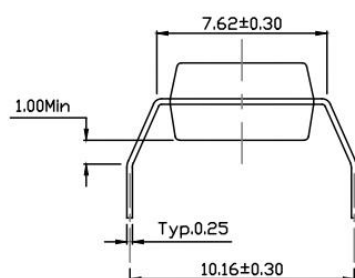
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**Package Dimension** *Dimensions in mm unless otherwise stated*

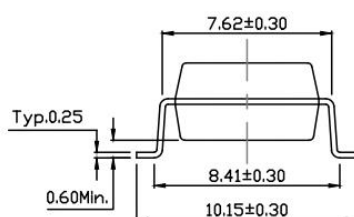


**Forming Option** *Dimensions in mm unless otherwise stated*

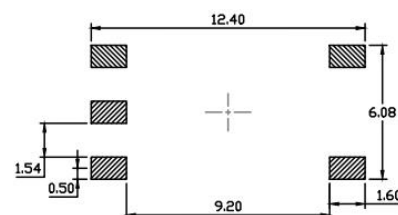
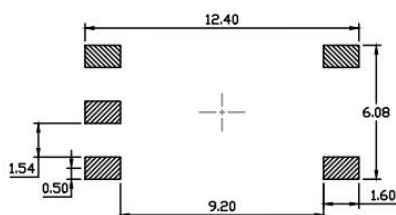
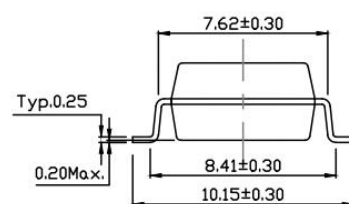
M Type



S Type

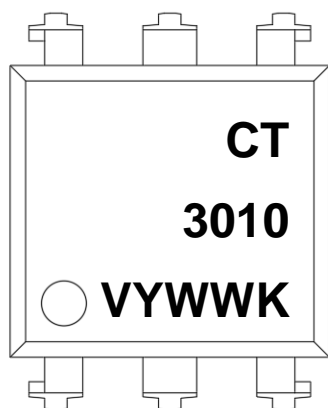


SL Type





## Marking Information



### Note:

CT : Denotes “CT Micro”  
3010 : Part Number  
V : VDE Safety Mark Option (Blank or V)  
Y : One Digit Year Code  
WW : Two Digit Work Week  
K : Manufacturing Code

## Ordering Information

### CT301X(V)(Y)(Z)-5L-G, CT302X(V)(Y)(Z)-5L-G

CT = Denotes “CT Micro”  
301X = Part Numbers (Current Ration Option X=0, 1 or 2)  
302X = Part Numbers (Current Ration Option X=0, 1, 2 or 3)  
V = VDE Safety Mark Option (Blank or V)  
Y = Lead Form Option (S, SL, M or Blank)  
Z = Tape and Reel Option (Blank, T1, T2, T3 or T4)  
5L = 5 PIN Lead Frame  
G = Material Option (G: Halogen Free, Blank: Non-Halogen Free)

Option	Description	Quantity
None	Standard 6 Pin Dip	50Units/Tube
M	Gullwing (400mil) Lead Forming	50Units/Tube
S(T1)	Surface Mount Lead Forming – With Option 1 Taping	1000 Units/Reel
S(T2)	Surface Mount Lead Forming – With Option 2 Taping	1000 Units/Reel
SL(T1)	Surface Mount (Low Profile) Lead Forming – With Option 1 Taping	1000 Units/Reel
SL(T2)	Surface Mount (Low Profile) Lead Forming – With Option 2 Taping	1000 Units/Reel

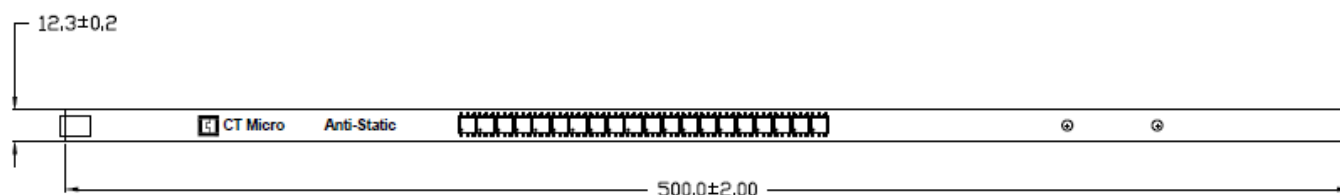


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## Carrier Specifications *Dimensions in mm unless otherwise stated*

### Tube Option Standard DIP

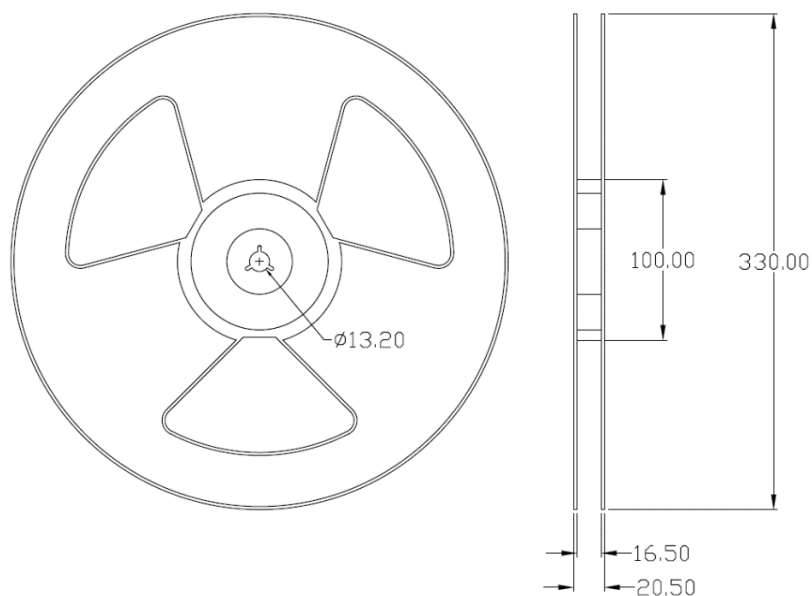


### Tube Option M Type



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

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





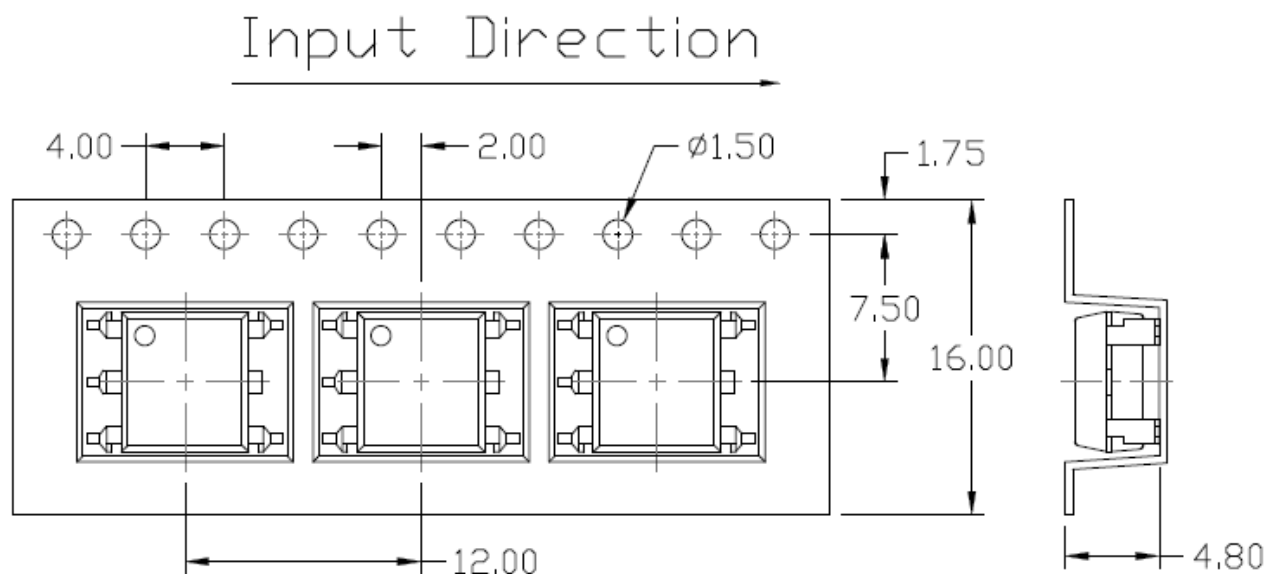


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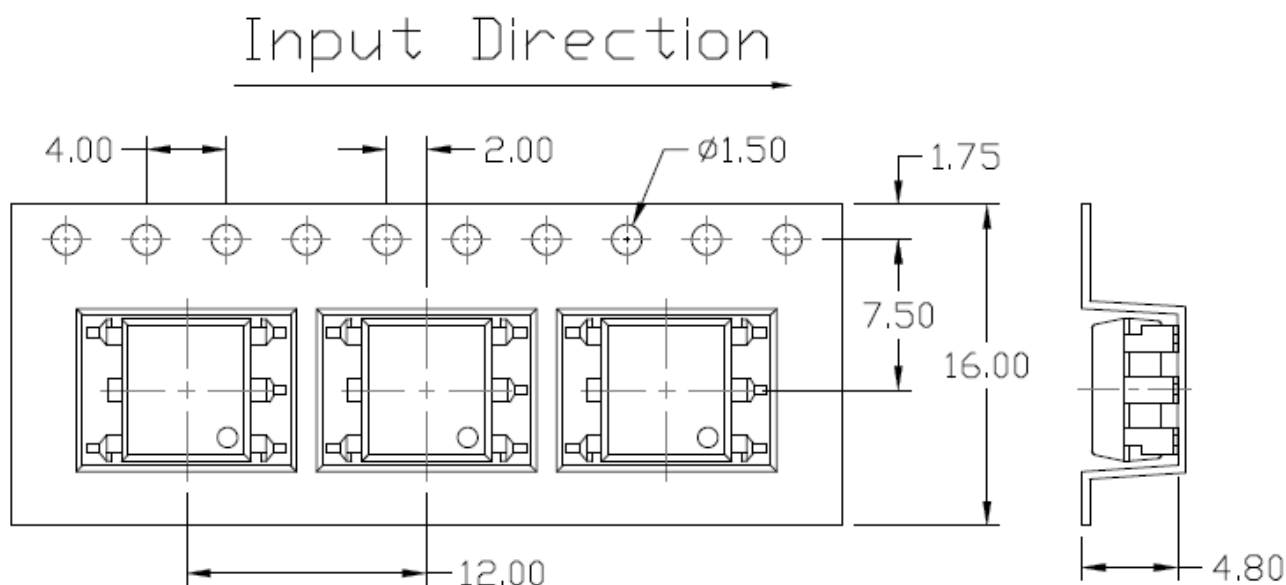
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**Carrier Tape Specifications** *Dimensions in mm unless otherwise stated*

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



**Option S (T2) & SL (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)

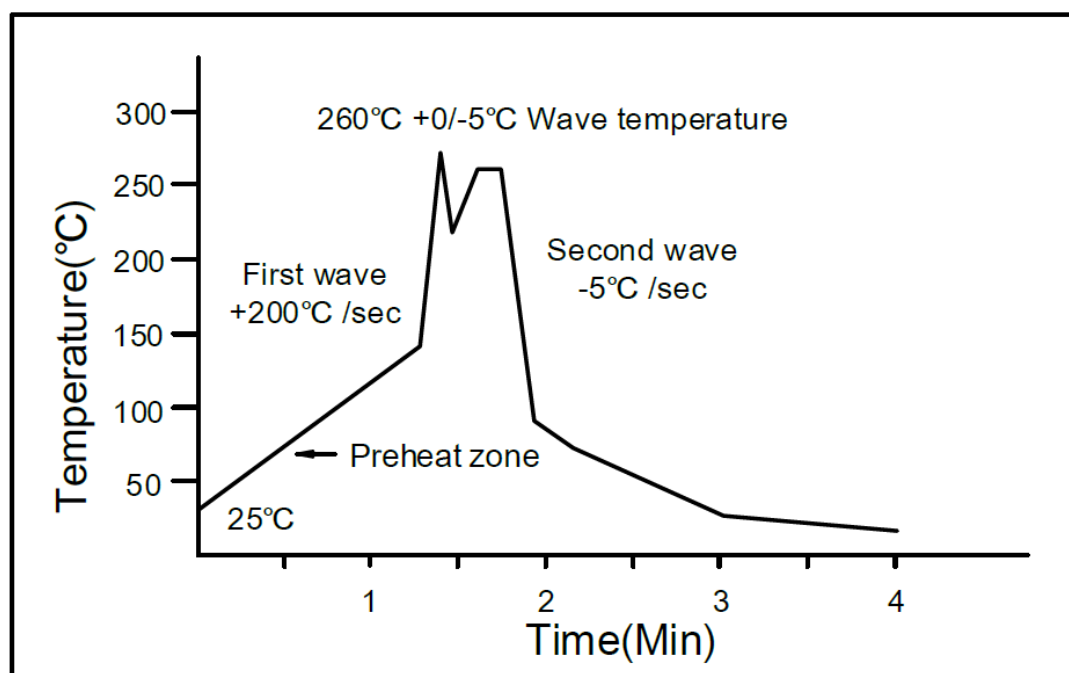
One time soldering is recommended within the condition of temperature.

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

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.

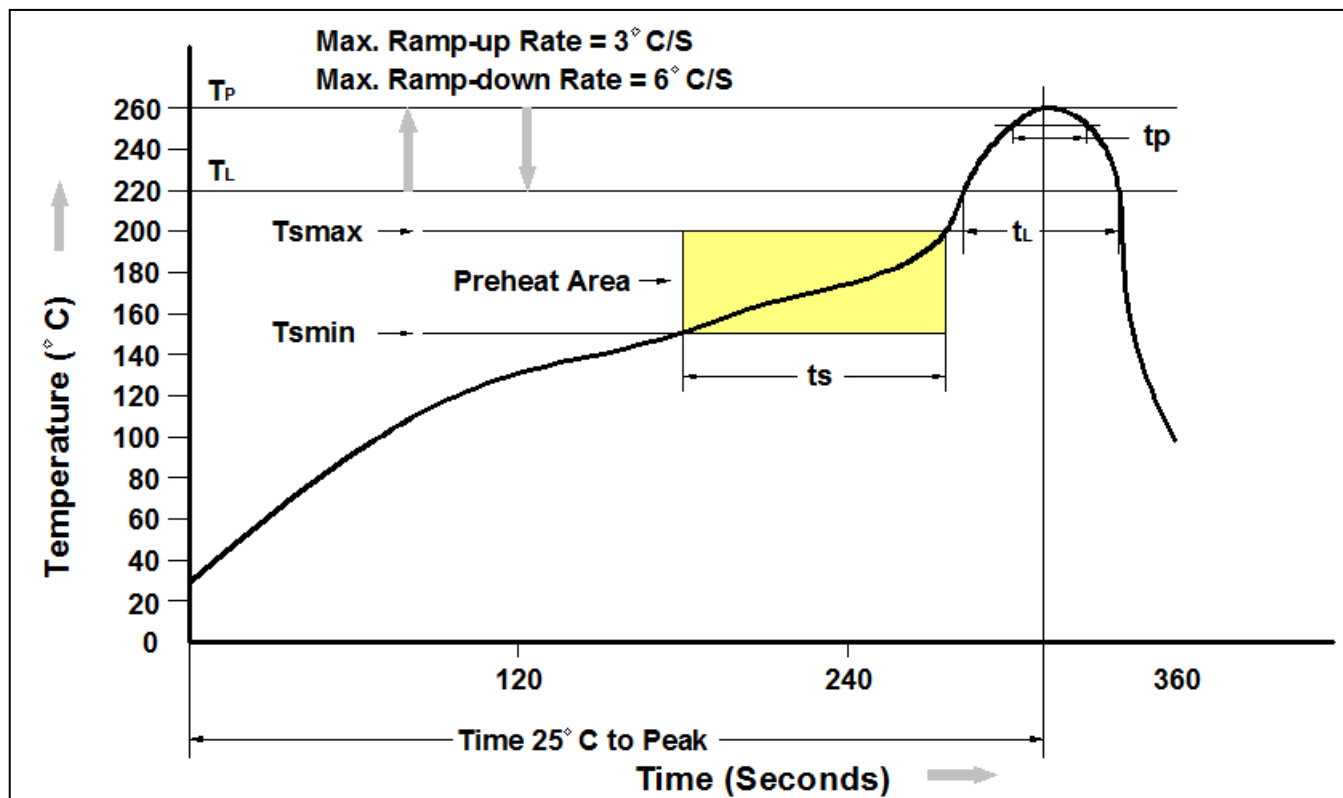
One time soldering is recommended.

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. (Tsmin)	150°C
Temperature Max. (Tsmax)	200°C
Time (ts) from (Tsmin 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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