



## Features

- High isolation 3750 V<sub>RMS</sub>
- OFF-state output terminal voltage: 400 V (min)
- Operating Temperature range - 40 °C to 85°C
- Creepage distance ≥ 5mm
- Distance Through Isolation > 0.4mm
- 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 (14001105803)
  - ✓ IEC62368 (FI/41119)

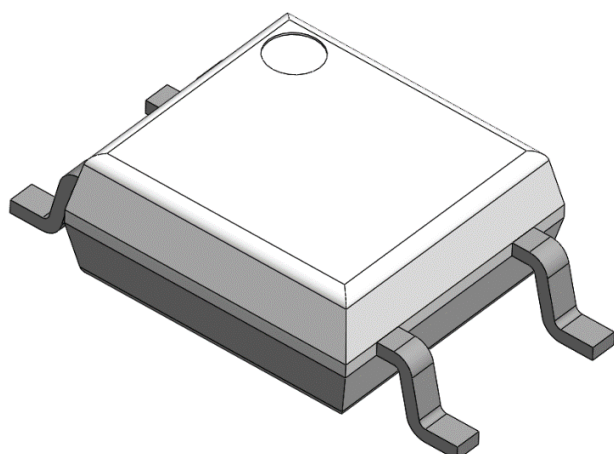
## Description

The CTR214-M4 consists of two MOSFET and one photovoltaic chip optically coupled to an Infrared-emitting diode in 4-lead Mini-Flat package.

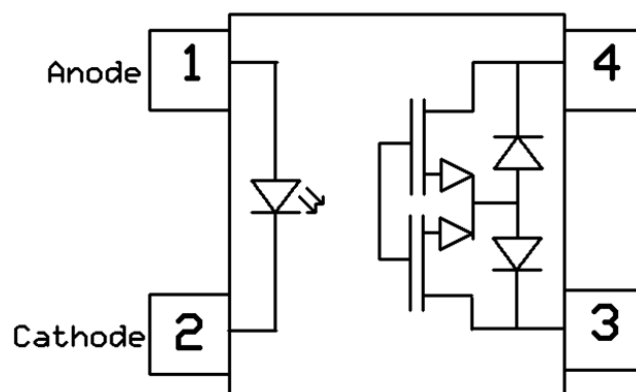
## Applications

- Battery Management System (BMS)
- Security Systems
- Smart Meters
- Mechanical relay replacements
- General telecom switching
- Industrial controls
- Automatic measurement equipment

## Package Outline



## Schematic



**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.)		3750	V <sub>rms</sub>	
T <sub>OPR</sub>	Operating temperature		-40 ~ +85	°C	
T <sub>STG</sub>	Storage temperature		-40 ~ +100	°C	
T <sub>SOL</sub>	Soldering temperature (For 10 seconds)		260	°C	
Emitter					
I <sub>F</sub>	LED forward current (50% duty, 1ms P.W)		50	mA	
I <sub>F(TRANS)</sub>	LED forward current (pulsed) (≤1μs P.W,300pps)		1	A	
V <sub>R</sub>	LED reverse voltage		5	V	
P <sub>C</sub>	Power dissipation		85	mW	
T <sub>j</sub>	Junction Temperature		115	°C	
Detector					
V <sub>OFF</sub>	OFF-state output terminal Voltage		400	V	
I <sub>ON</sub>	ON-state Current	CTR214	100	mA	
		CTR214B	160	mA	
P <sub>O</sub>	Output Power dissipation	CTR214	500	mW	
		CTR214B	384	mW	
T <sub>j</sub>	Junction Temperature		125	°C	
T <sub>jA</sub>	Junction to Ambient Temperature		60	°C	

**Recommended Operating Conditions**

Symbol	Parameters	Min	Typ	Max	Units
$V_{\text{DD}}$	Supply Voltage	-	-	320	V
$I_{\text{FT}}$	Trigger LED Current	5	10	20	mA
$T_{\text{OPR}}$	Operating temperature	-40	-	60	°C



## 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	$I_F = 10\text{mA}$	-	1.4	1.6	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
$I_{OFF}$	OFF-state Current	$V_{OFF} = 400\text{V}$	-	-	1	$\mu\text{A}$	
$C_{OFF}$	Output Capacitance	$V_O = 0\text{V}$ , $f = 1\text{MHz}$	-	30	-	pF	

### Transfer Characteristics

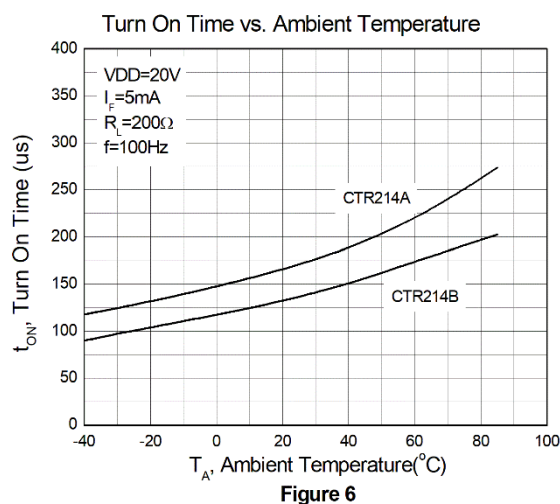
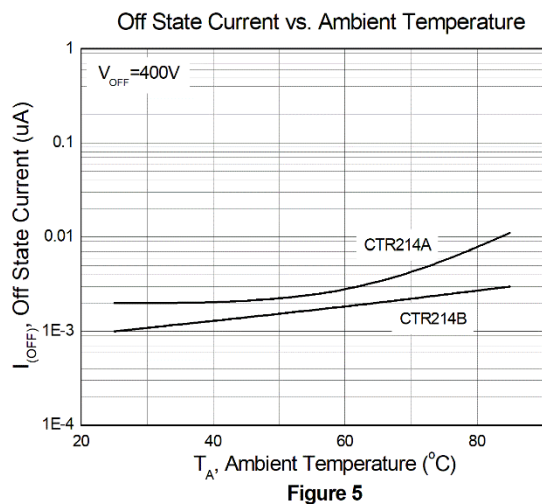
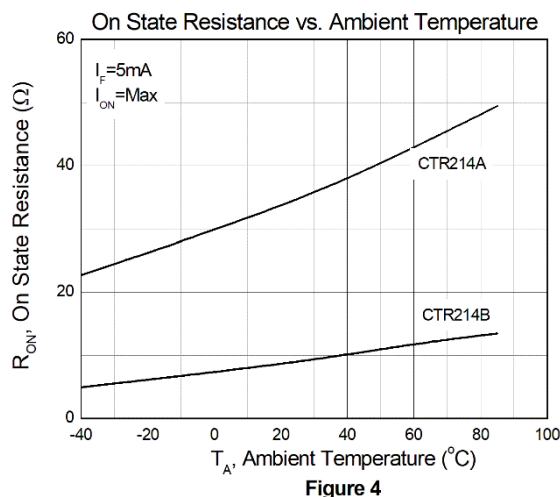
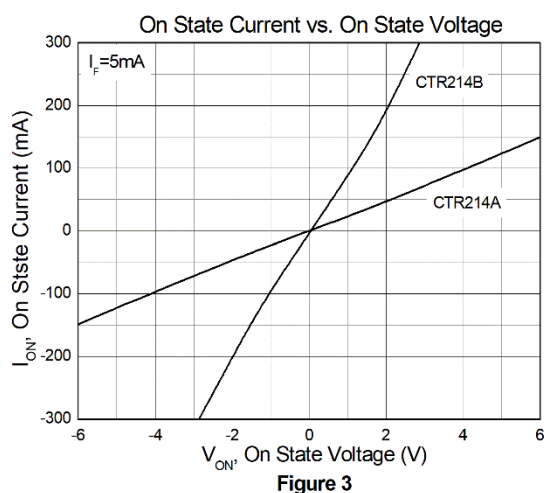
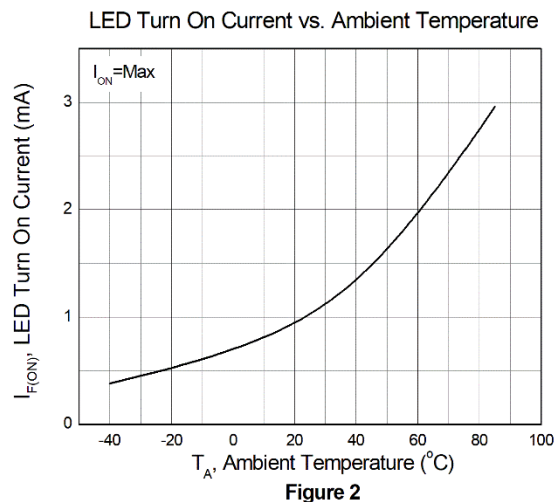
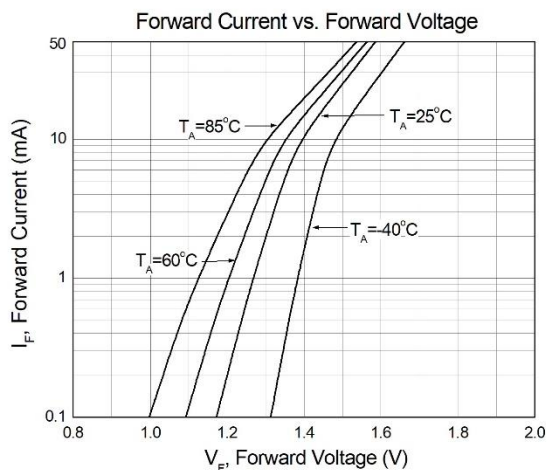
Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
$I_{FT}$	Trigger LED Current	$I_{ON} = \text{Max}$	-	1.5	3	mA	
$R_{ON}$	ON-state resistance	CTR214-M4 $I_{ON} = \text{Max}$ , $I_F = 5\text{mA}$ ,	-	-	50	$\Omega$	1
		CTR214B-M4 $t < 0.5\text{s}$	-	10	18	$\Omega$	

### Switching Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
$T_{ON}$	Turn-on Time	CTR214-M4	-	0.17	1	ms	
		CTR214B-M4	-	0.14	1	ms	
$T_{OFF}$	Turn-off Time	CTR214-M4		0.18	1	ms	
		CTR214B-M4		0.24	1	ms	



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





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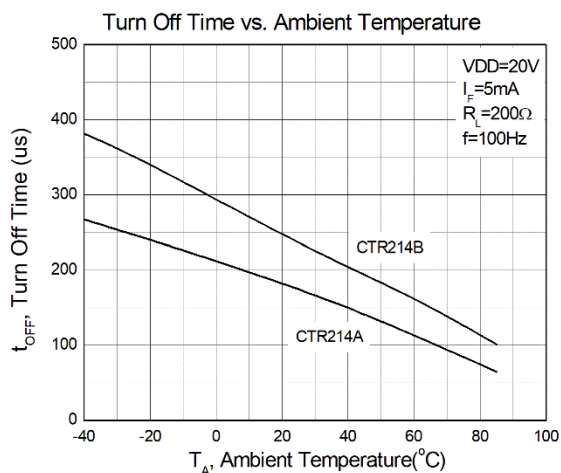


Figure 7

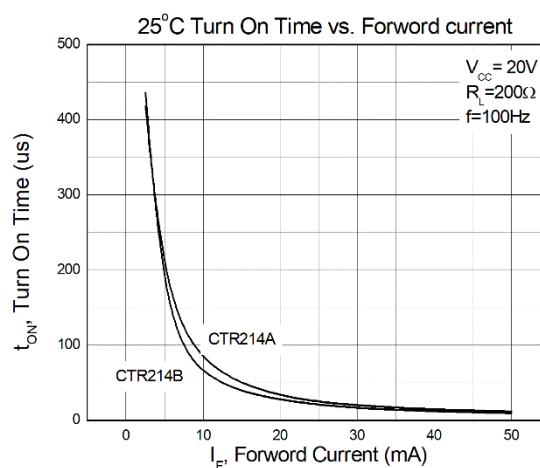


Figure 8

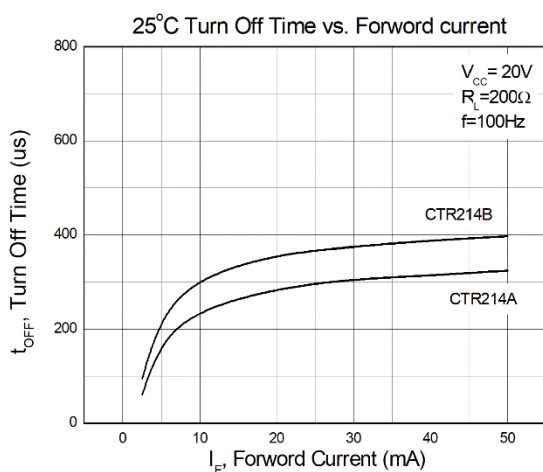


Figure 9



## Test Circuit

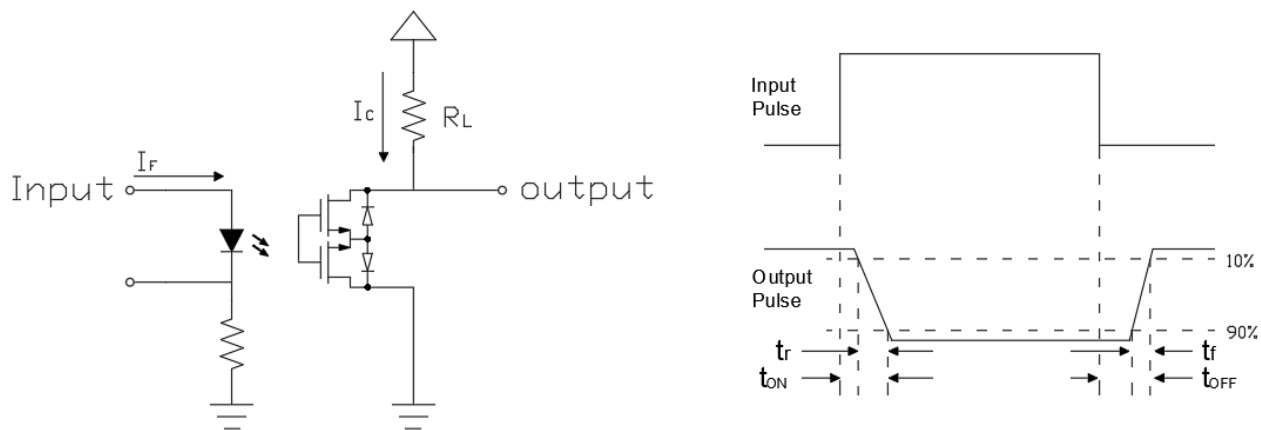
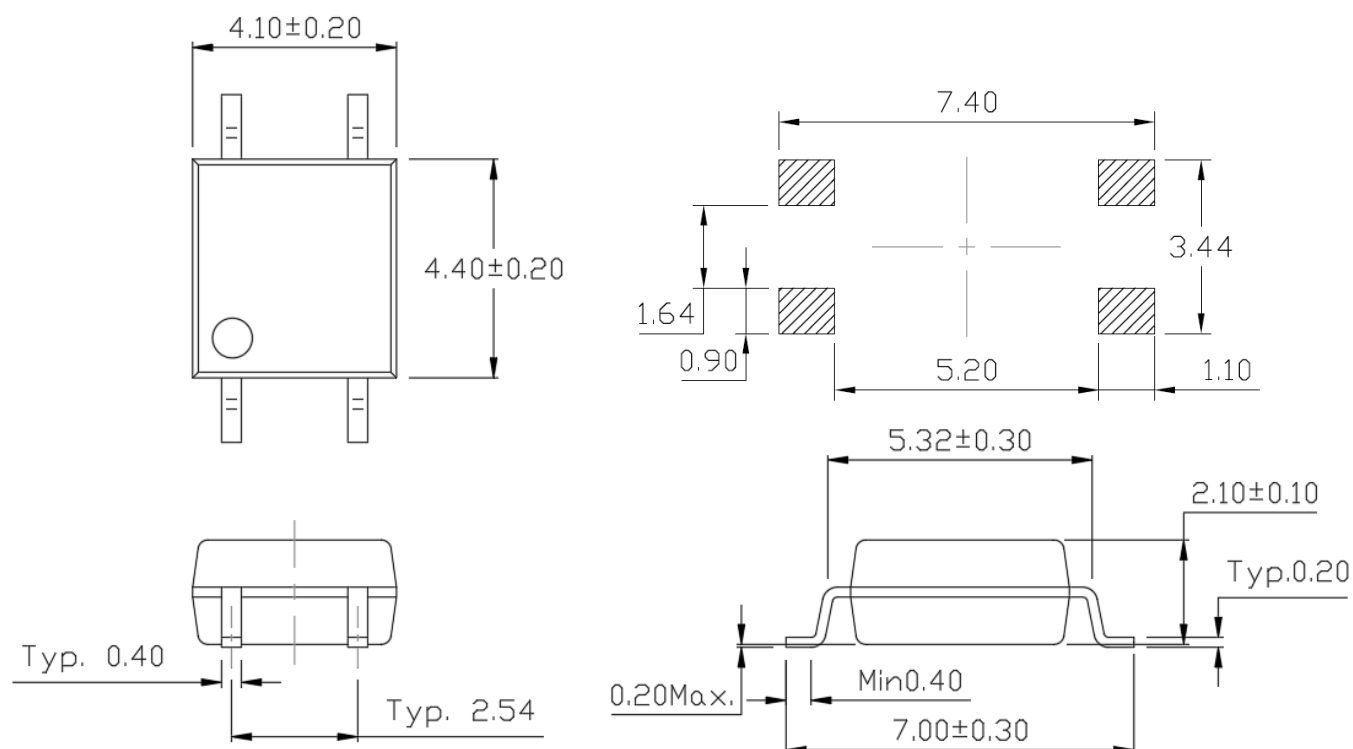


Figure 10: Switching Time Test Circuits



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



## Marking Information



### Note:

- CT : Denotes "CT Micro"
- R214 : Part Number
- X : Option (Blank or B)
- V : VDE Safety Mark Option (Blank or V)
- Y : One Digit Year Code
- WW : Two Digit Work Week
- K : Manufacturing Code



## Ordering Information

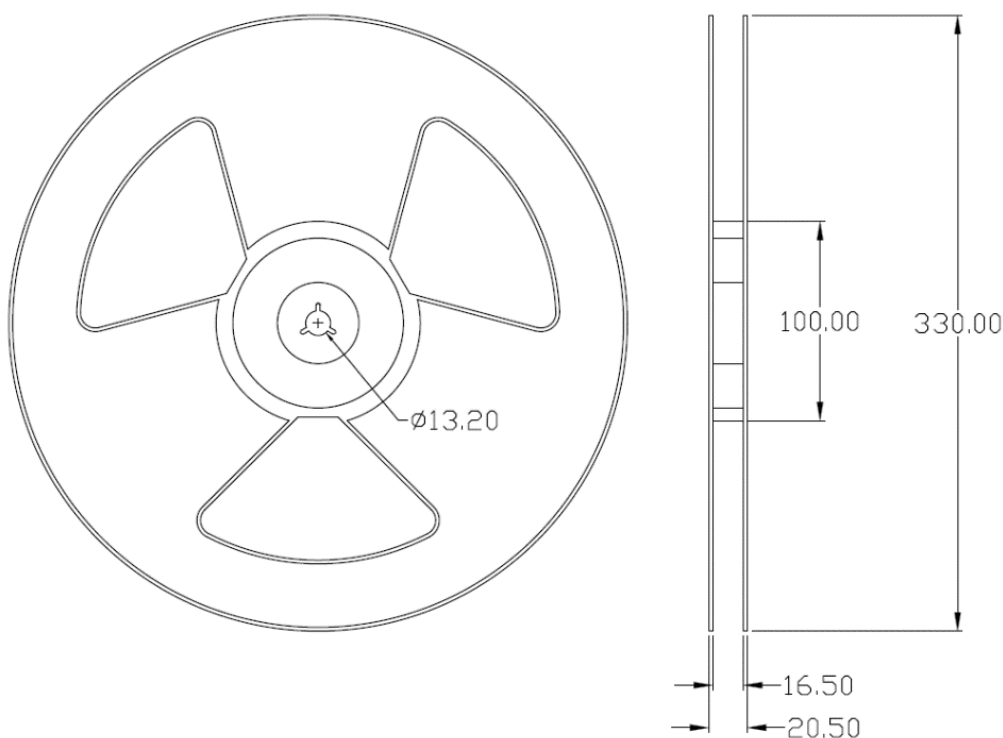
### CTR214(X)(V)(Z)-M4

CT	= Denotes "CT Micro"
R214	= Part Number
X	= Option (Blank or B)
V	= VDE Safety Mark Option (Blank or V)
Z	= Tape and Reel Option (T1 or T2)
M4	= MFP Package

Option	Description	Quantity
T1	Surface Mount Lead Forming – With Option 1 Tapping	3000 Units/Reel
T2	Surface Mount Lead Forming – With Option 2 Tapping	3000 Units/Reel

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

### Option T1/T2

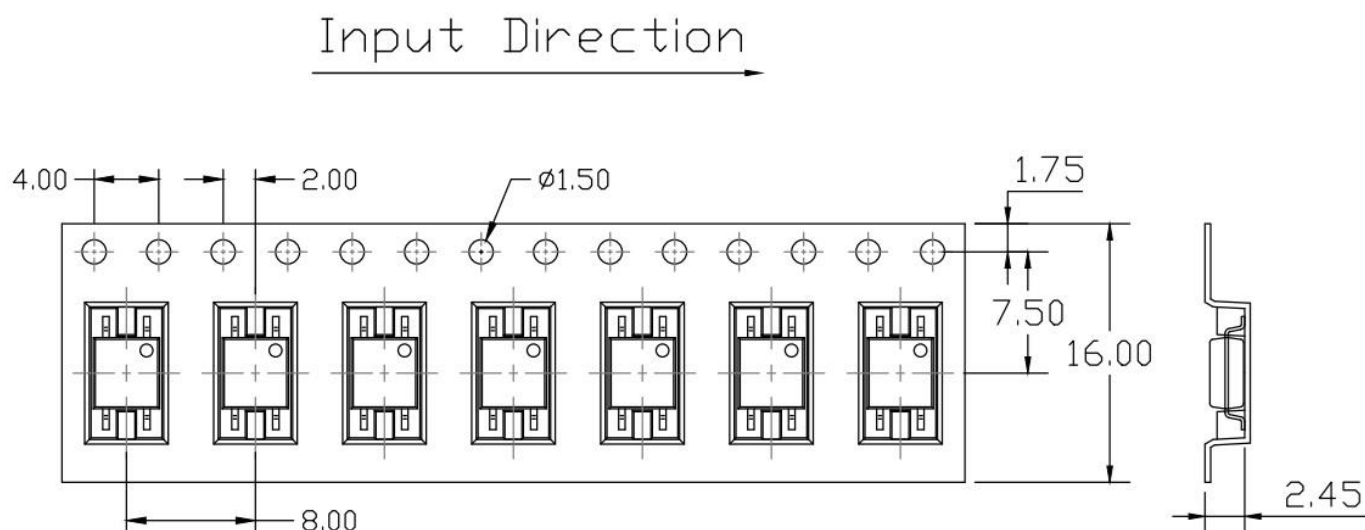




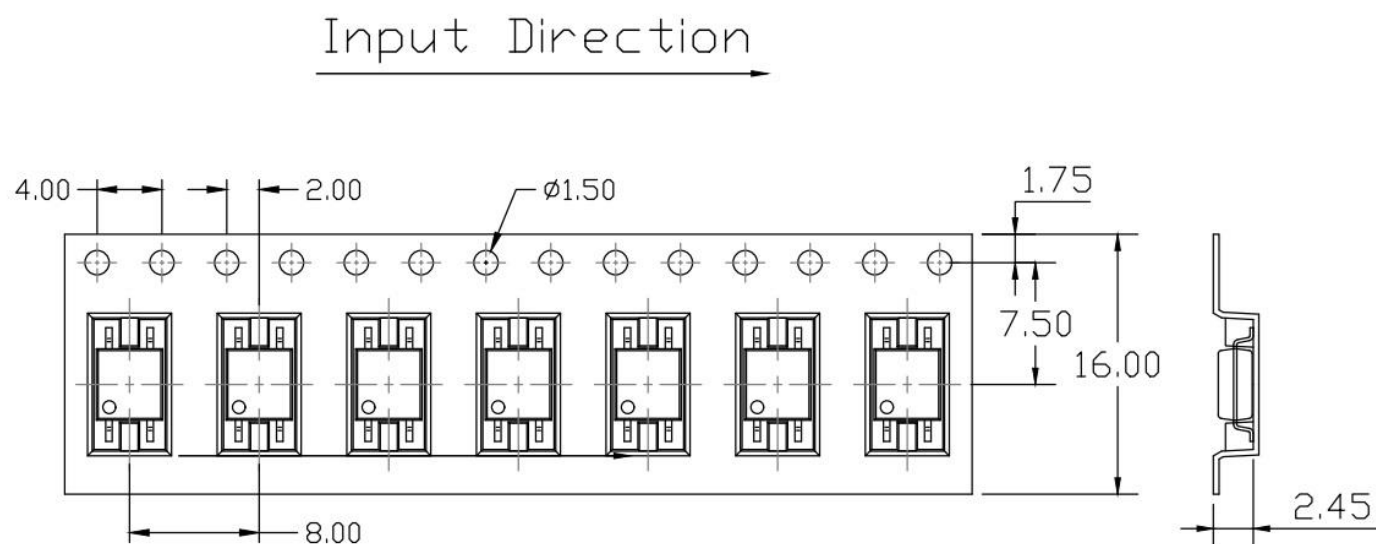


**Carrier Tape Specifications** *Dimensions in mm unless otherwise stated*

**Option T1**



**Option 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)

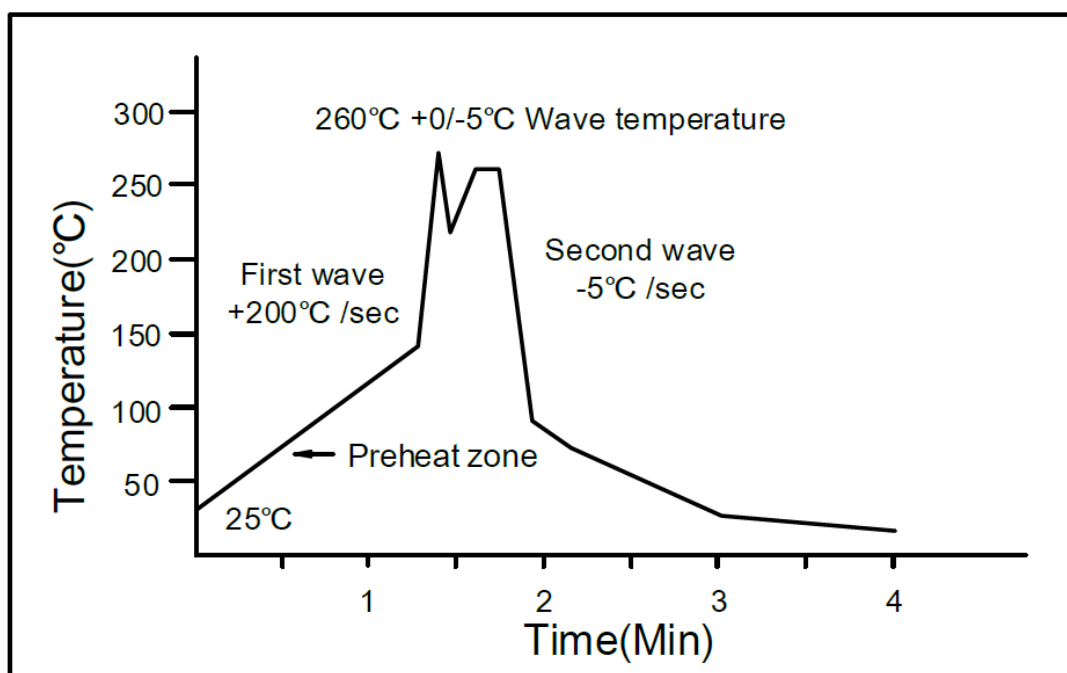
One time soldering is recommended within the condition of temperature.

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)

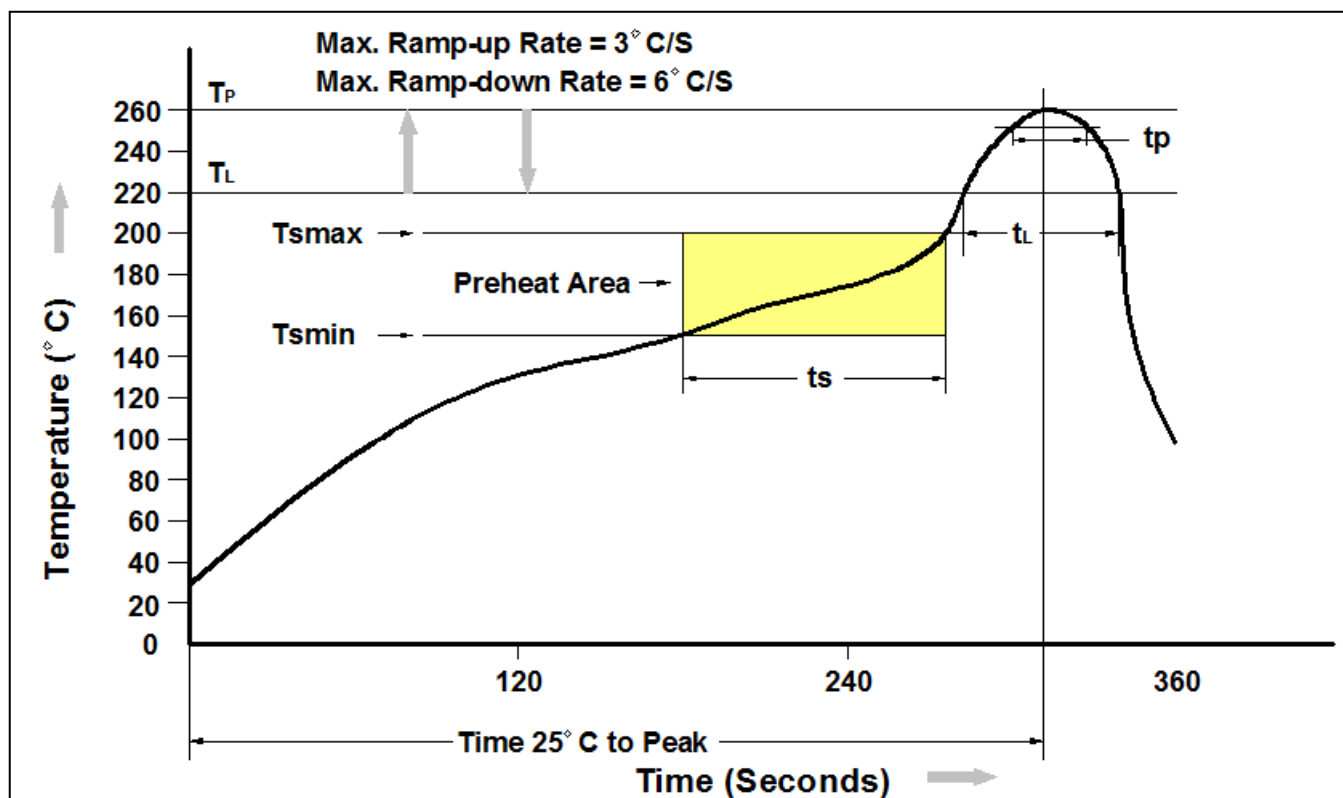
Allow single lead soldering in every single process.

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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