CT451 Series

DC Input 4-Pin Phototransistor Optocoupler

Features

- High isolation 3750 VRMS
- CTR flexibility available see order information
- DC input with transistor output
- RoHS compliance
- REACH compliance
- Halogen free compliance
- Operating temperature range - 55 °C to 100 °C
- Regulatory Approvals
  - UL - UL1577 (E364000)
  - VDE - EN60747-5-5(VDE0884-5)
  - CQC – GB4943.1, GB8898
  - IEC60065, IEC60950

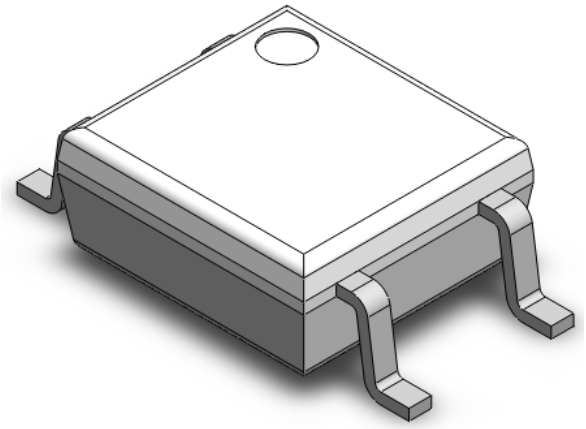
Description

The CT451 series consists of a high power transistor optically coupled to a gallium arsenide Infrared-emitting diode in a 4-lead Mini-Flat package.

Applications

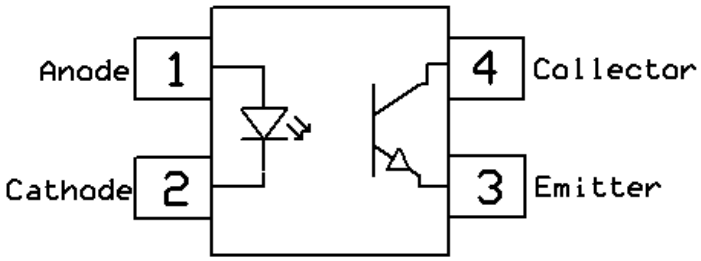
- Switch mode power supplies
- Computer peripheral interface
- Microprocessor system interface

Package Outline



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

Schematic



Absolute Maximum Rating at 25°C

Symbol	*Parameters*	*Ratings*	*Units*	*Notes*
V_{ISO}	Isolation voltage	3750	V_{RMS}	
P_{TOT}	Total power dissipation	260	mW	
T_{OPR}	Operating temperature	-55 ~ +100	°C	
T_{STG}	Storage temperature	-55 ~ +150	°C	
T_{SOL}	Soldering temperature	260	°C	
Emitter				
I_F	Forward current	80	mA	
$I_{F(TRANS)}$	Peak transient current (≤1μs P.W,300pps)	1	A	
V_R	Reverse voltage	6	V	
P_D	Emitter power dissipation	150	mW	
Detector				
P_D	Detector power dissipation	300	mW	
B_{VCEO}	Collector-Emitter Breakdown Voltage	350	V	
B_{VECO}	Emitter-Collector Breakdown Voltage	7	V	
I_C	Collector Current	100	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	-	1.2	1.4	V	
I_R	Reverse Current	V_R = 6V	-	-	5	μA	
C_{IN}	Input Capacitance	f= 1MHz	-	30	-	pF	

Detector Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
B_{VCEO}	Collector-Emitter Breakdown	I_C= 0.1mA	350	-	-	V	
B_{VECO}	Emitter-Collector Breakdown	I_E= 0.1mA	7	-	-	V	
I_{CEO}	Collector-Emitter Dark Current	V_{CE}= 200V, I_F=0mA	-	-	100	nA	

Transfer Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
CTR	Current Transfer Ratio	I_F= 5mA, V_{CE}= 5V	50	-	600	%	
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage	I_F= 20mA, I_C= 1mA	-	-	0.4	V	
R_{IO}	Isolation Resistance	V_{IO}= 500V_{DC}	$5x10^{10}$	-	-	Ω	
C_{IO}	Isolation Capacitance	f= 1MHz	-	0.5	1	pF	

Switching Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
t_r	Rise Time	I_C= 2mA, V_{CE}= 2V, R_L= 100Ω	-	6	-	μs	
t_f	Fall Time		-	8	-		

Typical Characteristic Curves

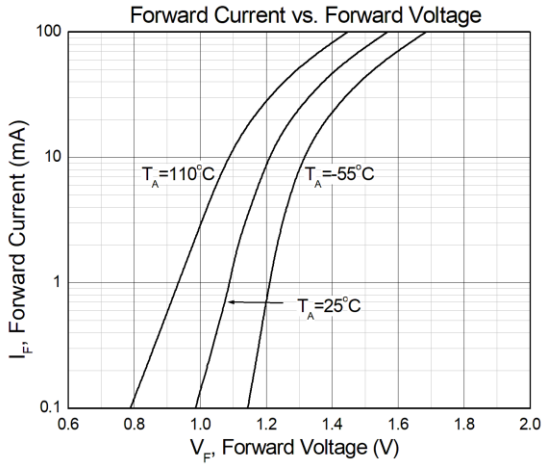


Figure 1

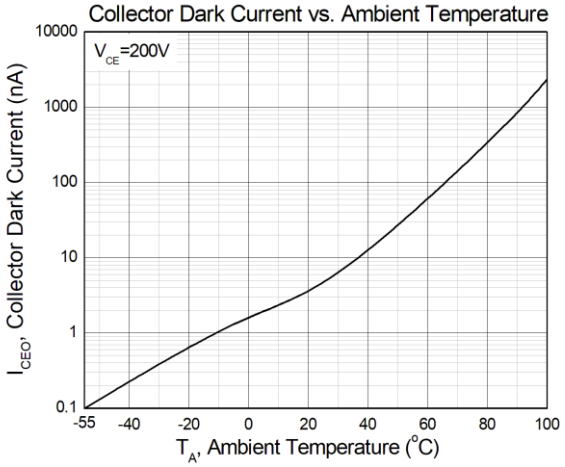


Figure 2

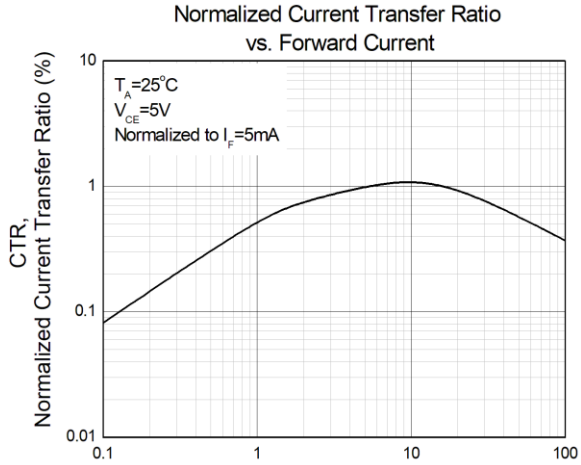


Figure 3

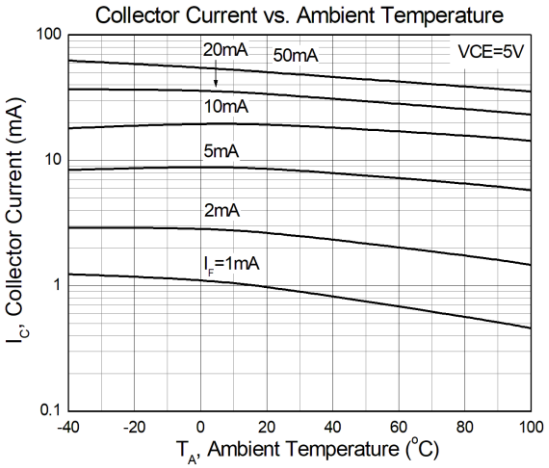


Figure 4

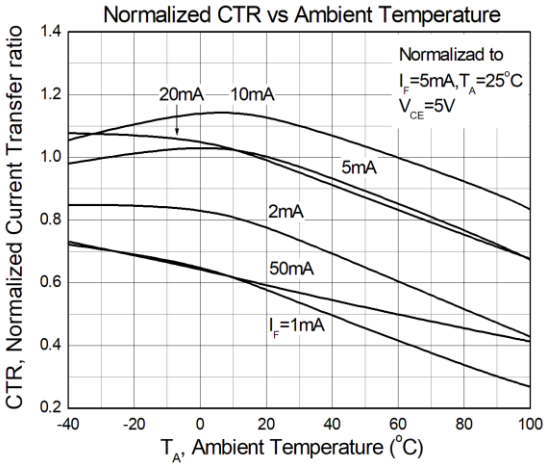


Figure 5

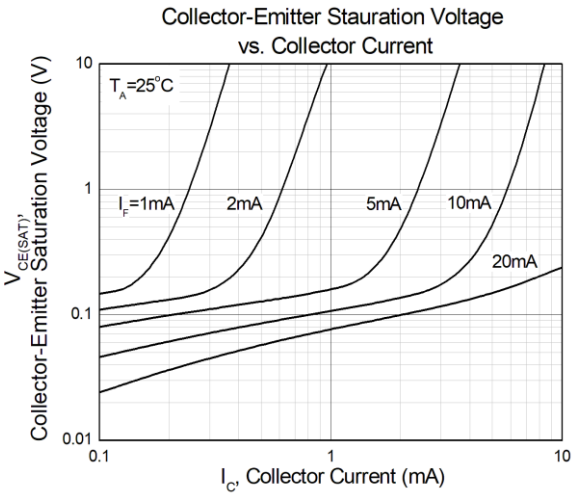


Figure 6

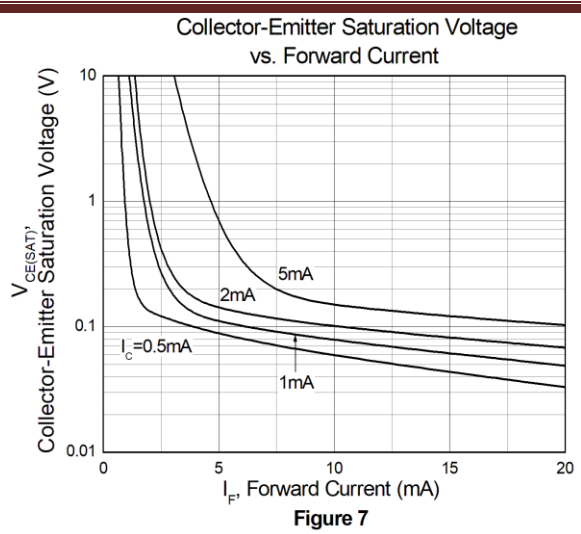


Figure 7

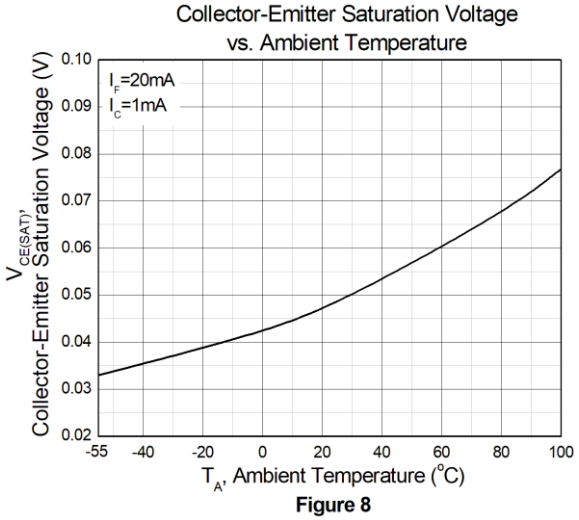


Figure 8

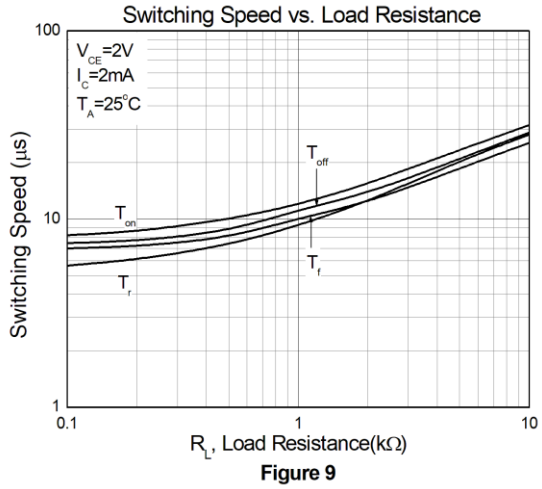


Figure 9

Test Circuit

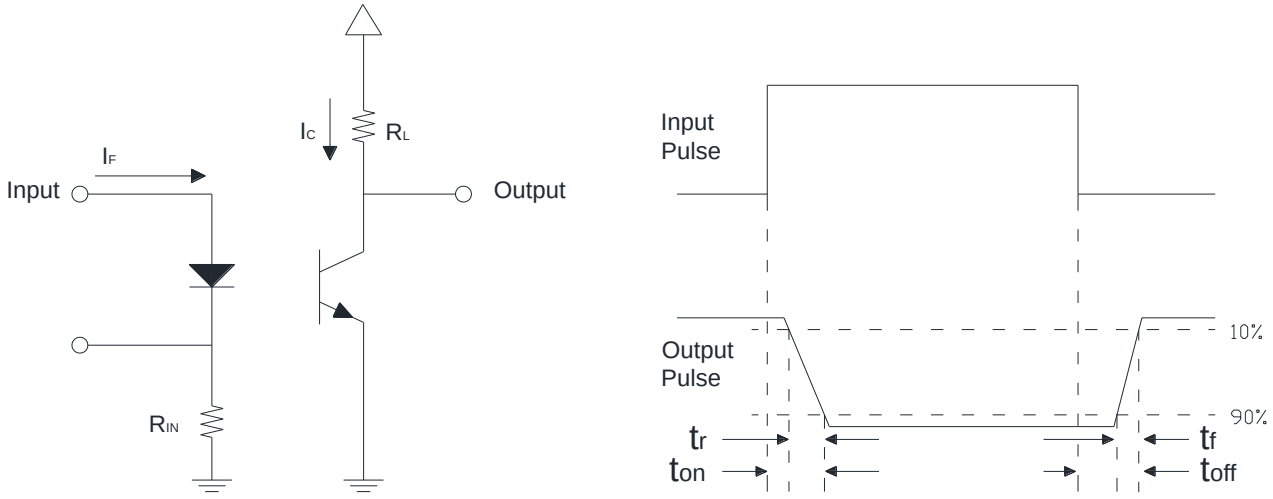
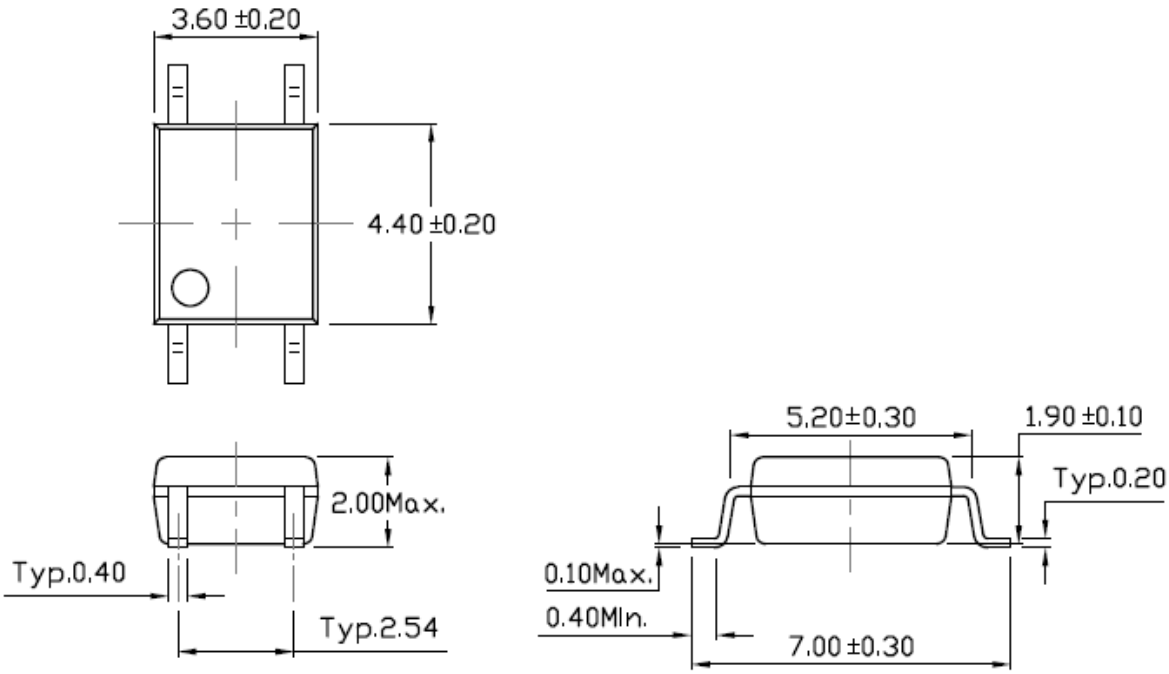
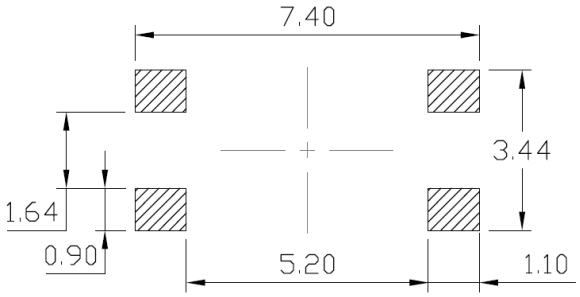


Figure 12: Switching Time Test Circuits

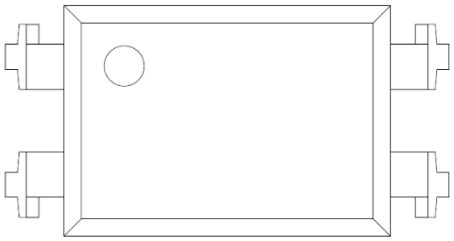
Package Dimension *Dimensions in mm unless otherwise stated*



Recommended Solder Mask *Dimensions in mm unless otherwise stated*



Marking Information



CT
451
VYWWK

Note:

CT : Denotes “CT Micro”
451 : Part Number
V : VDE Option
Y : Fiscal Year
WW : Work Week
K : Manufacturing Code

Ordering Information

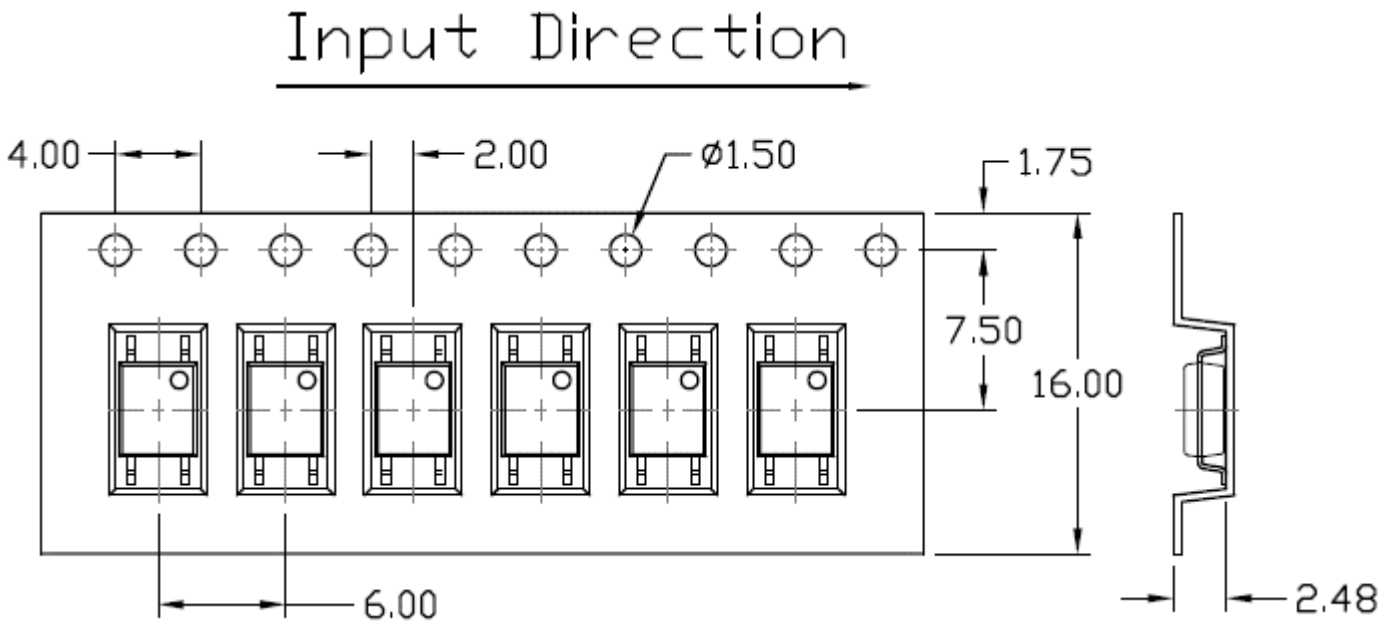
CT451(V)(Z)

CT =Denotes “CT Micro”
451 =Part Number
V = VDE Option (V or None)
Z = Tape and reel option (T1, T2)

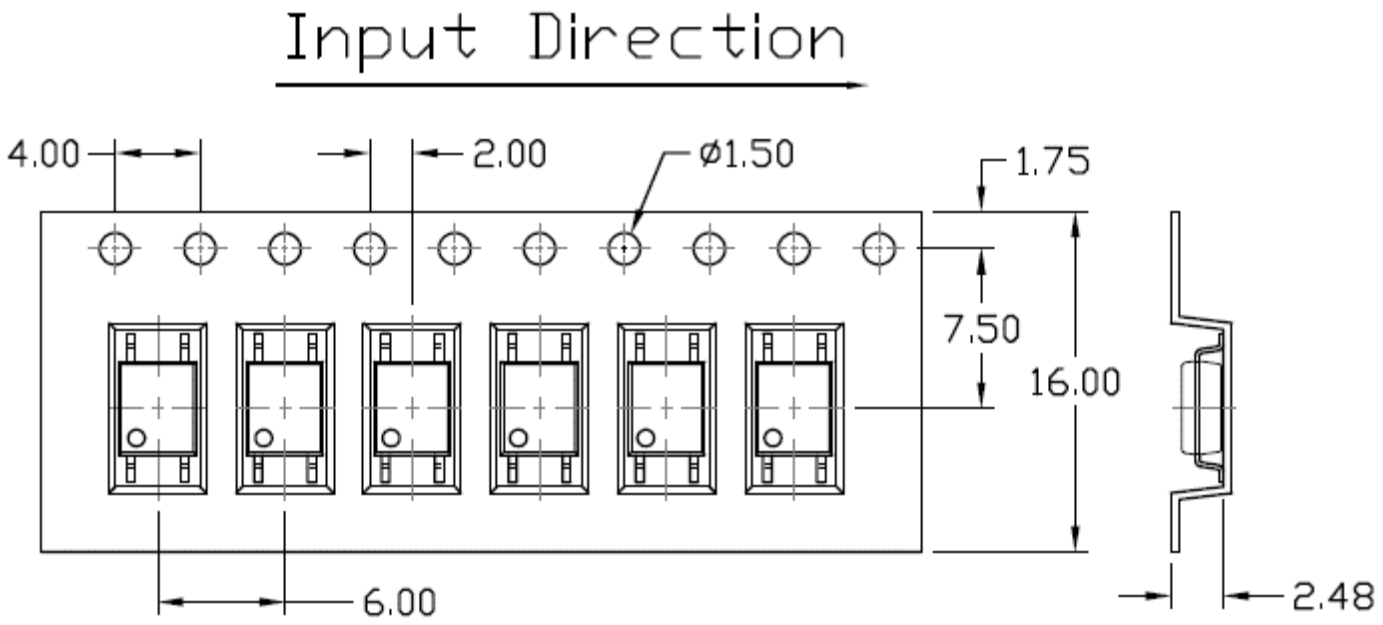
Option	*Description*	*Quantity*
T1	Surface Mount Lead Forming – With Option 1 Taping	3000 Units/Reel
T2	Surface Mount Lead Forming – With Option 2 Taping	3000 Units/Reel

Carrier Tape Specifications *Dimensions in mm unless otherwise stated*

Option T1

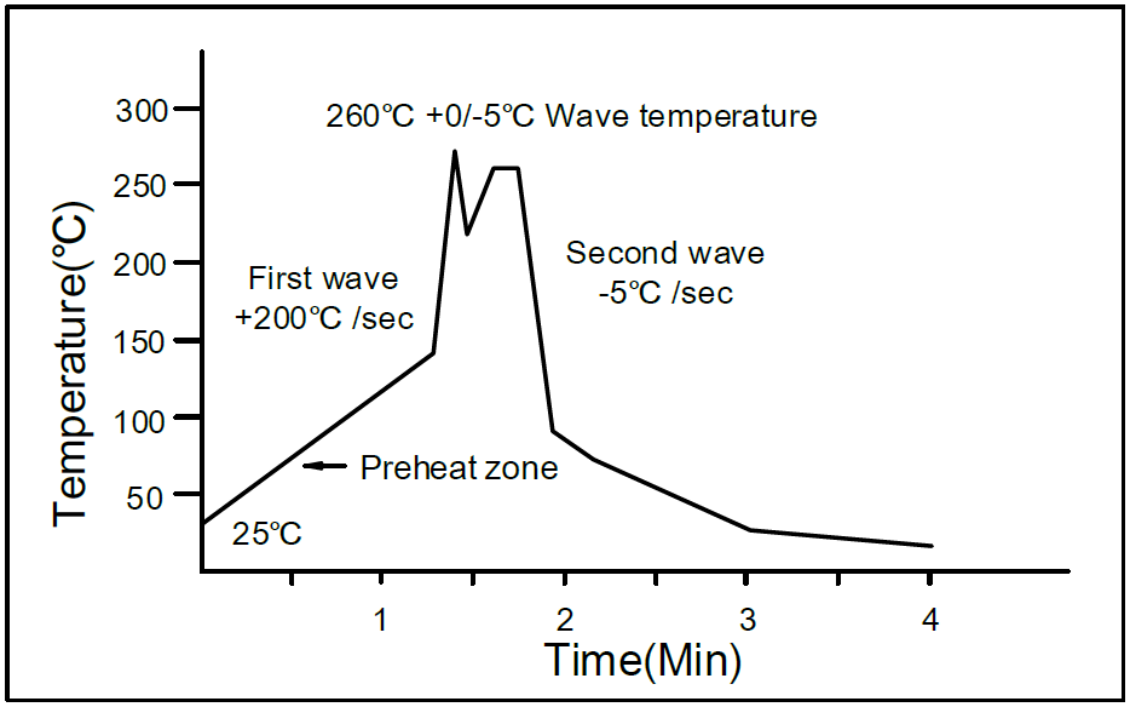


Option T2



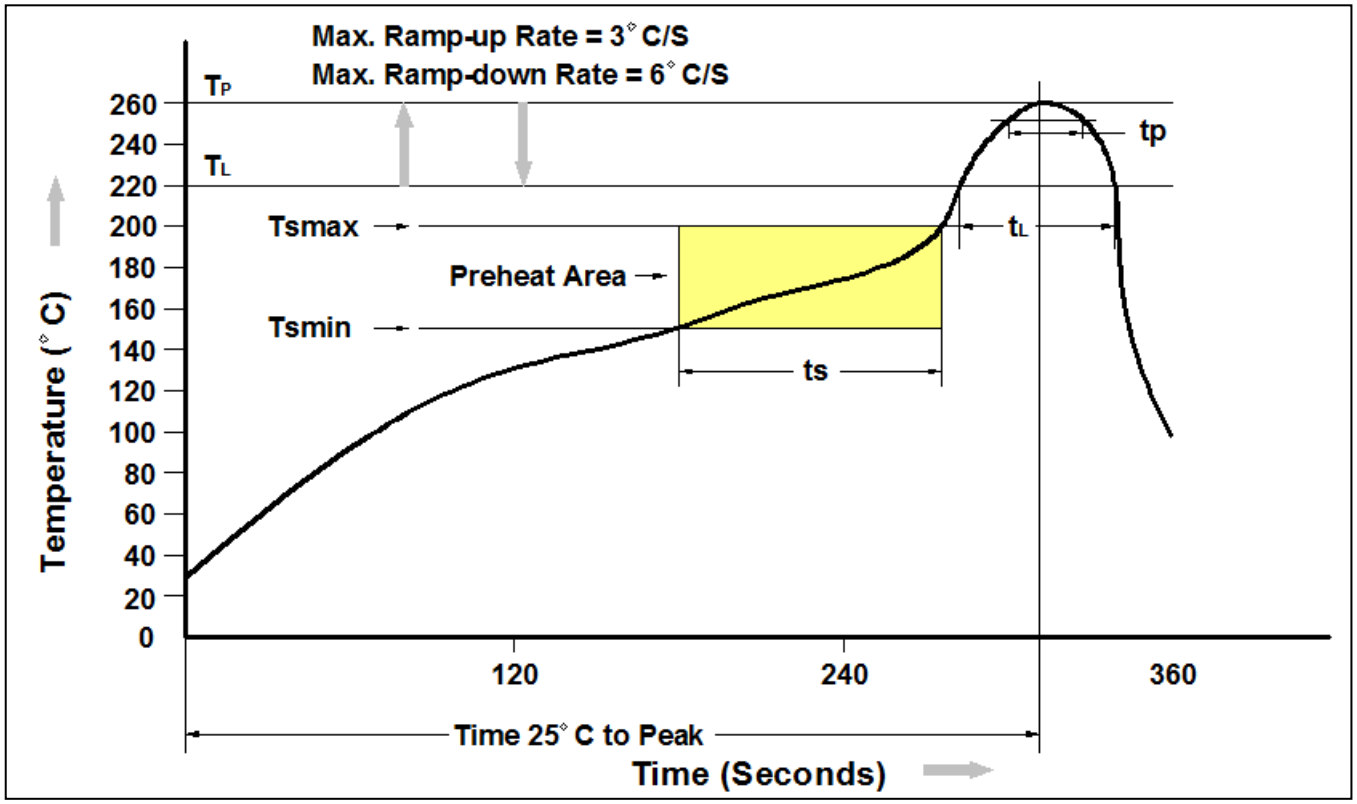
Wave soldering (follow the JEDEC standard JESD22-A111)

- 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.
-



- **Hand soldering by soldering iron**
- Allow single lead soldering in every single process.
- One time soldering is recommended. Temperature: 380+0/-5˚C
- Time: 3 sec max.

Reflow Profile



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

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.*