



# AC Input 4-Pin Phototransistor Optocoupler

## Features

- High isolation 5000 VRMS
- CTR flexibility available see order information
- DC input with transistor output
- External Creepage  $\geq 7.5\text{mm}$  (S/SL Type)
- External Creepage  $\geq 8.0\text{mm}$  (SLM Type)
- Operating Temperature range - 55 °C to 110 °C
- Regulatory Approvals
  - UL - UL1577 (E364000)
  - VDE - EN60747-5-5(VDE0884-5)
  - CQC – GB4943.1, GB8898
  - IEC60065, IEC60950

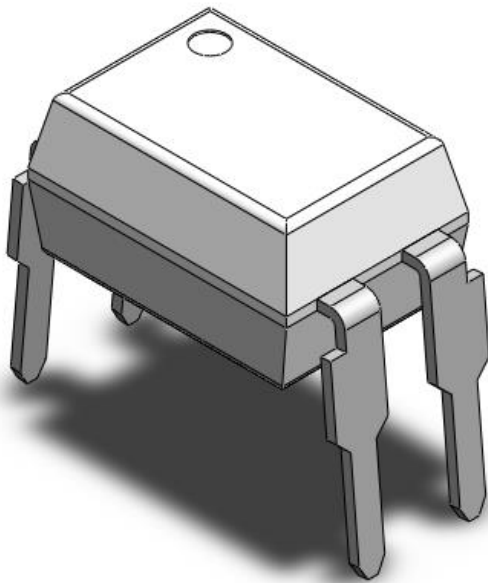
## Description

The CT814 series consists of a phototransistor optically coupled to two gallium arsenide Infrared-emitting diode, connected in inverse parallel, in a 4-lead DIP package with bending options.

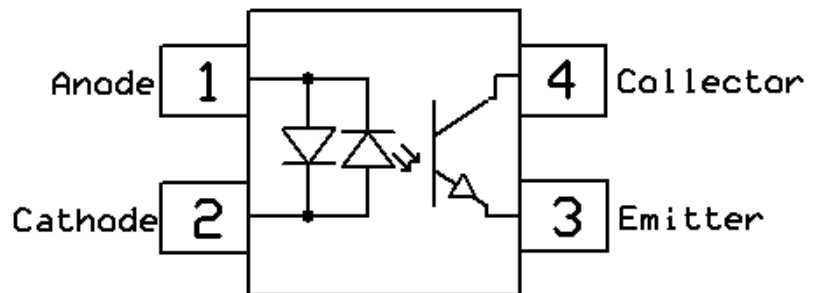
## Applications

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

## Package Outline



## Schematic



**Absolute Maximum Rating at 25°C**

<b>Symbol</b>	<b>Parameters</b>	<b>Ratings</b>	<b>Units</b>	<b>Notes</b>
V <sub>ISO</sub>	Isolation voltage	5000	V <sub>RMS</sub>	
P <sub>TOT</sub>	Total power dissipation	200	mW	
T <sub>OPR</sub>	Operating temperature	-55 ~ +110	°C	
T <sub>STG</sub>	Storage temperature	-55 ~ +150	°C	
T <sub>SOL</sub>	Soldering temperature	260	°C	
<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	
P <sub>D</sub>	Emitter power dissipation	100	mW	
<b>Detector</b>				
P <sub>D</sub>	Detector 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	



AC Input 4-Pin 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	$I_F = \pm 10\text{mA}$	-	1.24	1.4	V	
$C_{IN}$	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	

**Transfer Characteristics**

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes	
CTR	Current Transfer Ratio	$I_F = \pm 1\text{mA}, V_{CE} = 5\text{V}$	CT814	20	-	300	%	
			CT814A	50	-	150		
			CT814B	100	-	300		
	CTR Symmetry	$I_F = \pm 1\text{mA}, V_{CE} = 5\text{V}$	0.7	-	1.3			
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage	$I_F = \pm 20\text{mA}, I_C = 1\text{mA}$	-	0.04	0.2	V		
$R_{IO}$	Isolation Resistance	$V_{IO} = 500\text{V}_{DC}$	$5 \times 10^{10}$	-	-	$\Omega$		
$C_{IO}$	Isolation Capacitance	$f = 1\text{MHz}$	-	0.5	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	-	$\mu\text{s}$	
$t_f$	Fall Time		-	8	-		



Typical Characteristic Curves

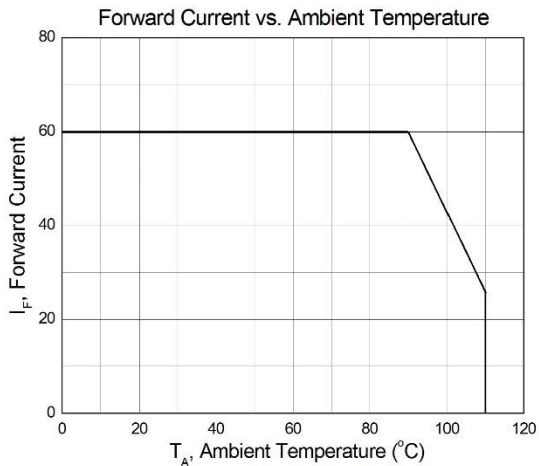


Figure 1

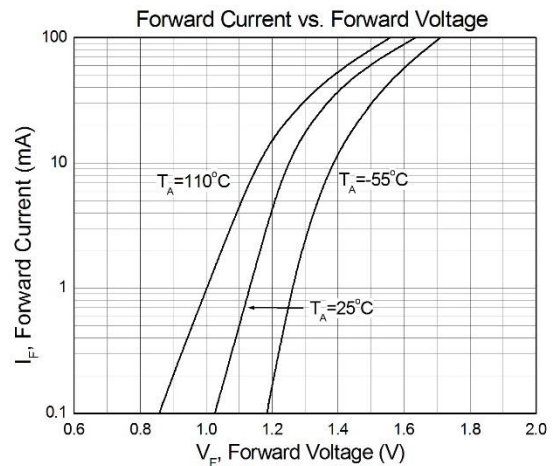


Figure 2

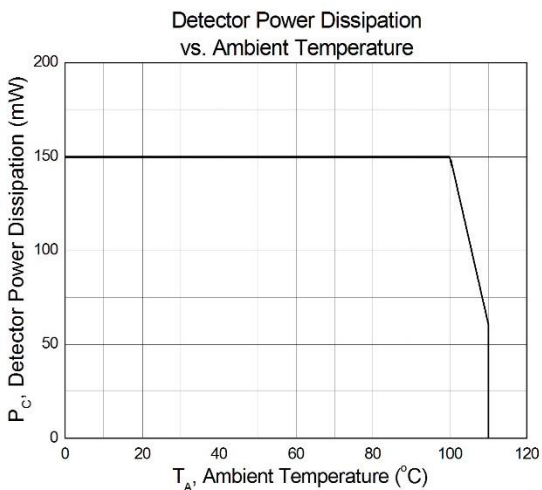


Figure 3

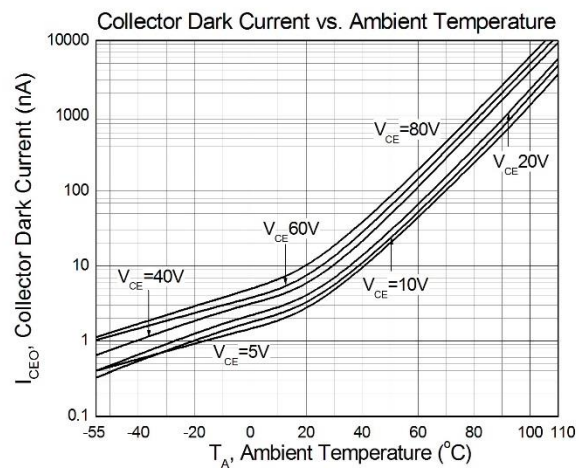


Figure 4

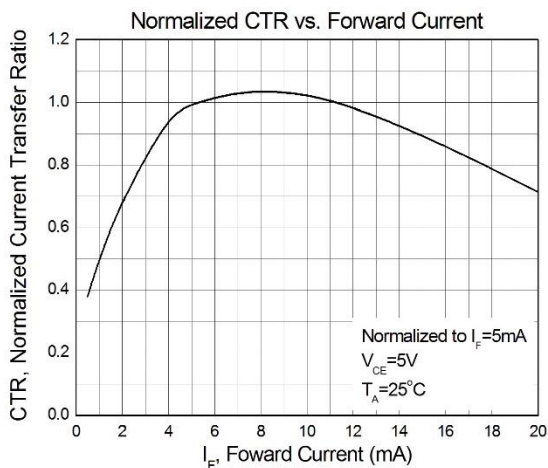


Figure 5

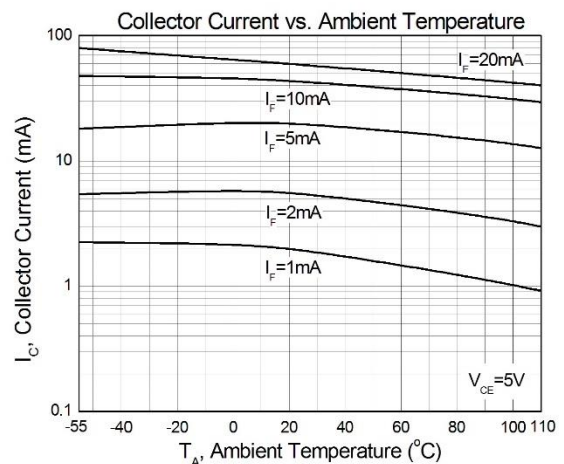


Figure 6

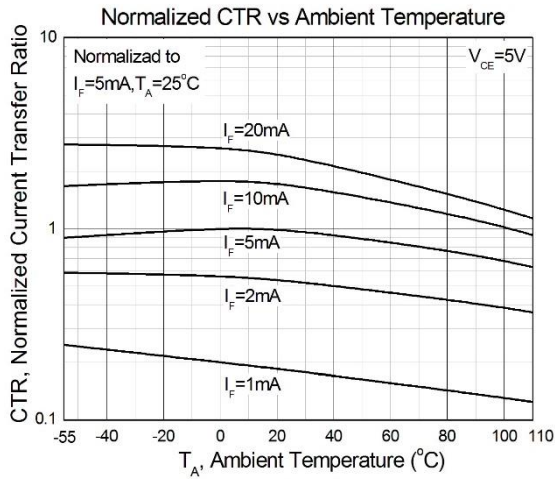


Figure 7

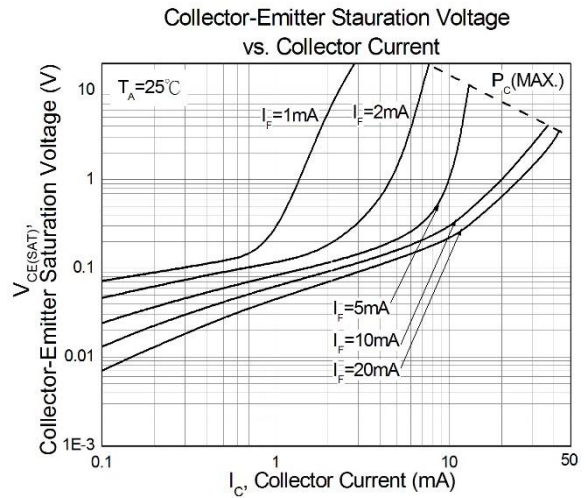


Figure 8

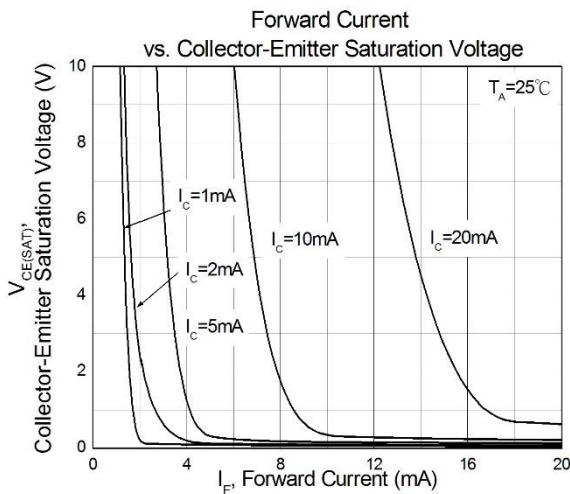


Figure 9

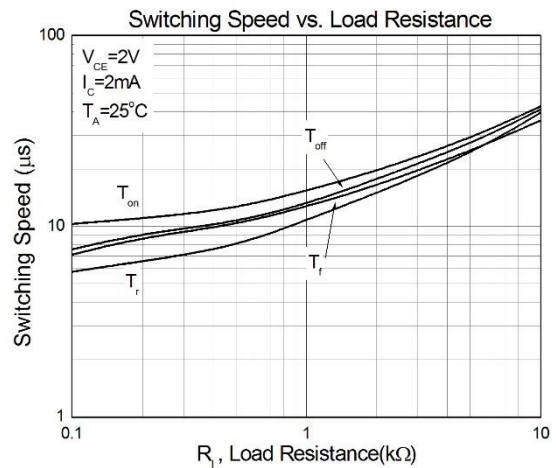


Figure 10

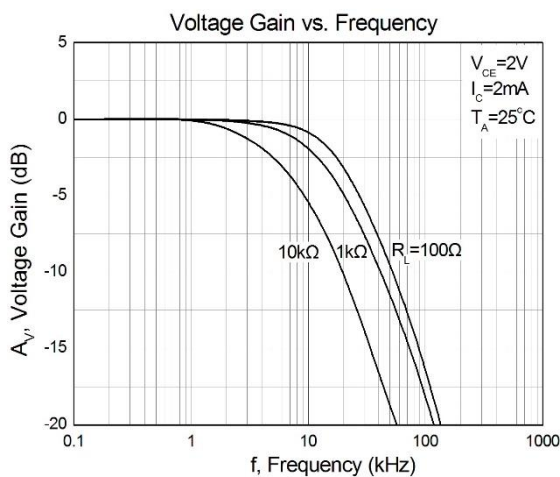
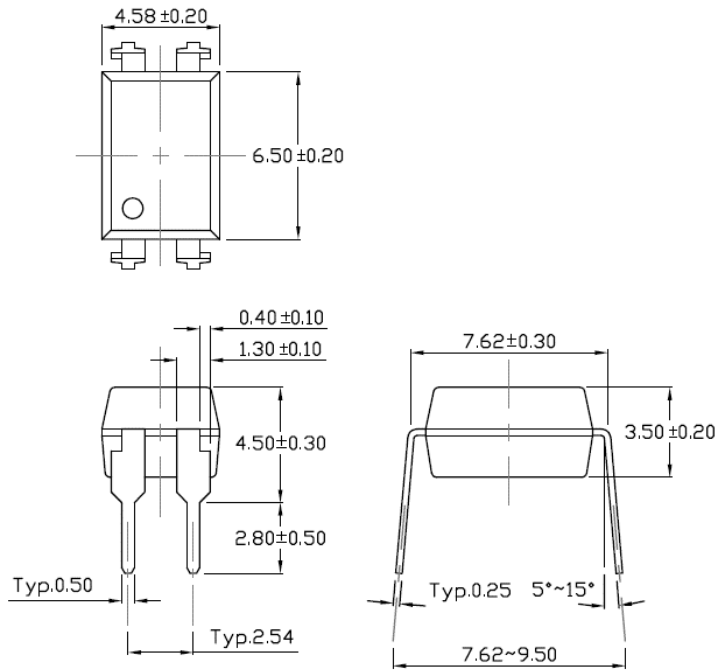


Figure 11

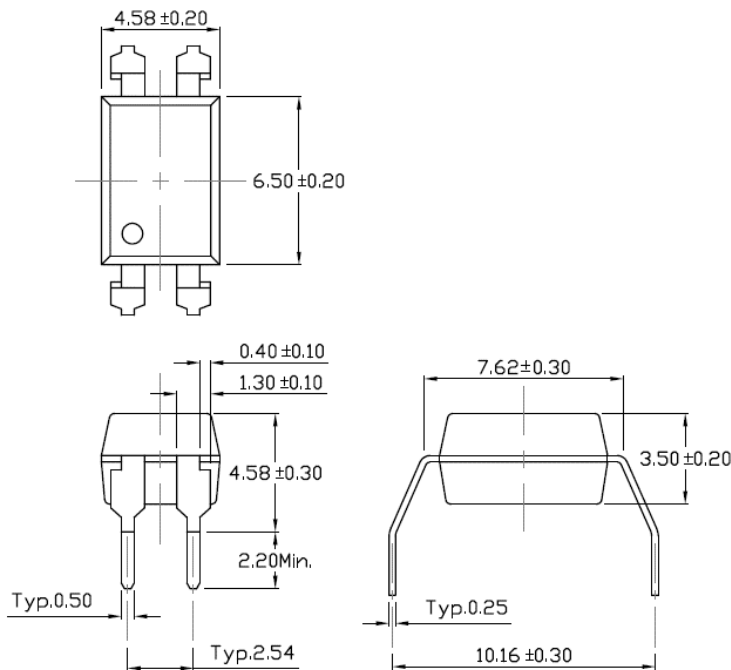


**Package Dimension** *Dimensions in mm unless otherwise stated*

**Standard DIP – Through Hole**

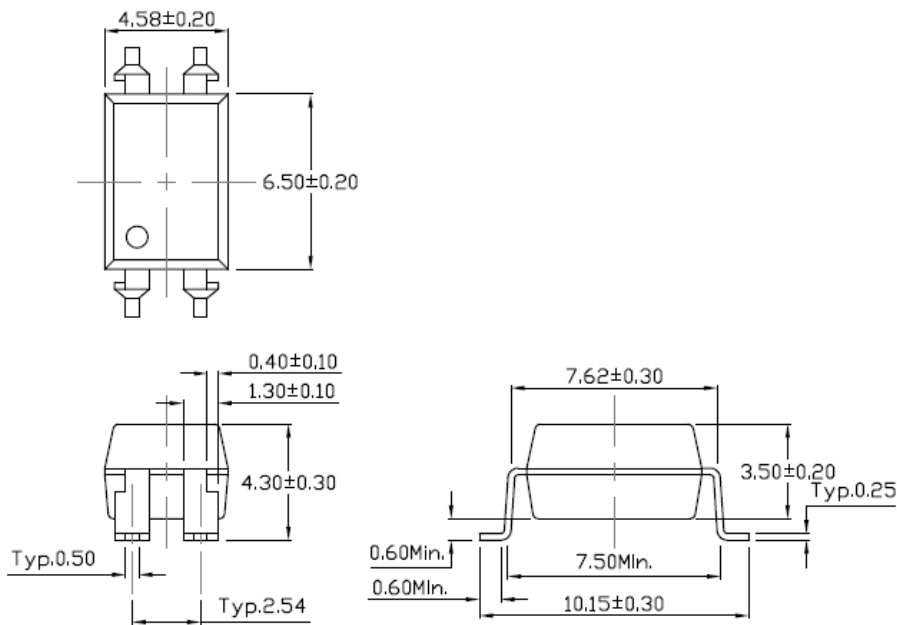


**Gullwing (400mil) Lead Forming – Through Hole (M Type)**

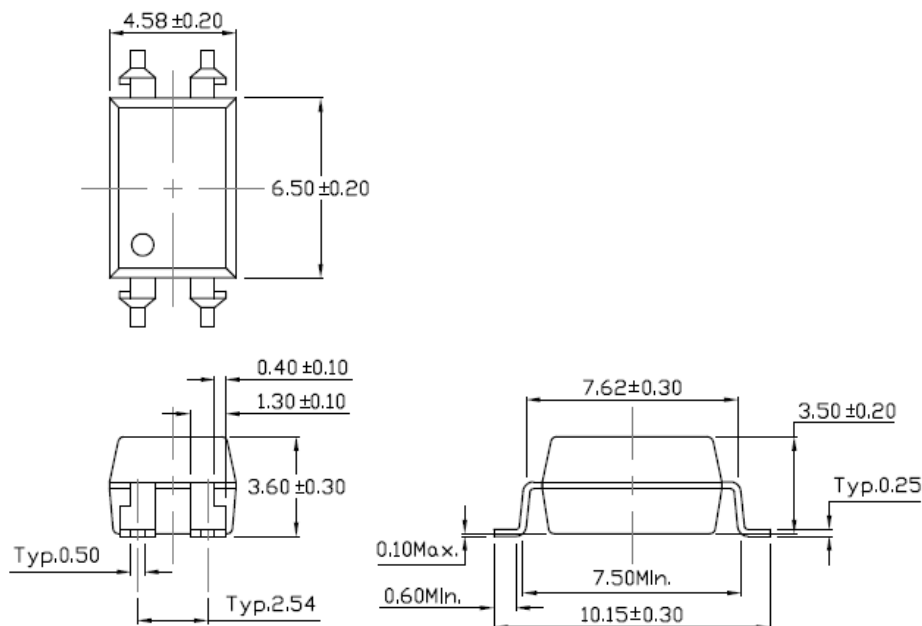




Surface Mount Lead Forming (S Type)

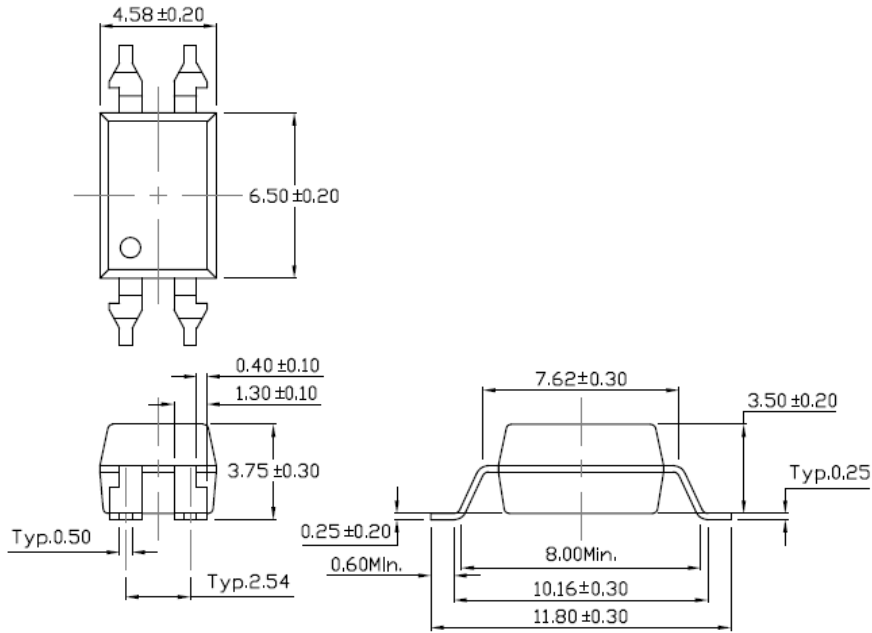


Surface Mount (Low Profile) Lead Forming (SL Type)





Surface Mount (Gullwing) Lead Forming (SLM Type)

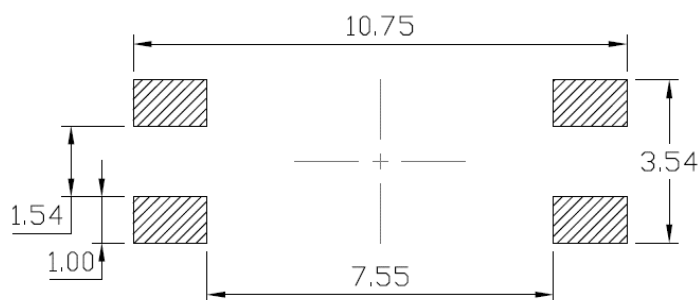




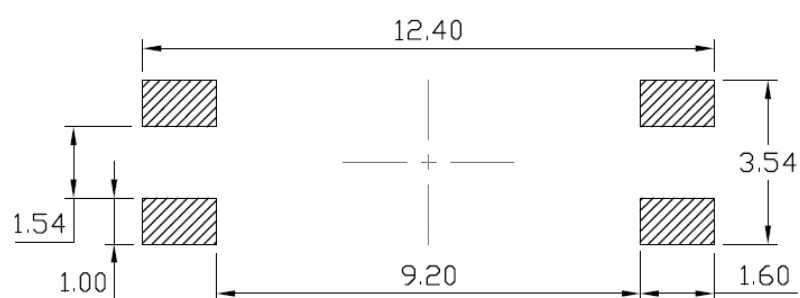


**Recommended Solder Mask** *Dimensions in mm unless otherwise stated*

**Surface Mount Lead Forming & Surface Mount (Low Profile) Lead Forming**



**Surface Mount (Gullwing) Lead Forming**



**Marking Information**



**Note:**

- CT : Denotes "CT Micro"
- 814 : Part Number
- R : CTR Rank
- V : VDE Option
- Y : Fiscal Year
- WW : Work Week
- K : Manufacturing Code

**Ordering Information****CT814X(V)(Y)(Z)-G**

X = Part No. (X=A, B or None)

V = VDE Option ( V or None)

Y = Lead form option (S, SL, M, SLM or none)

Z = Tape and reel option (T1, T2, T3, T4 or none)

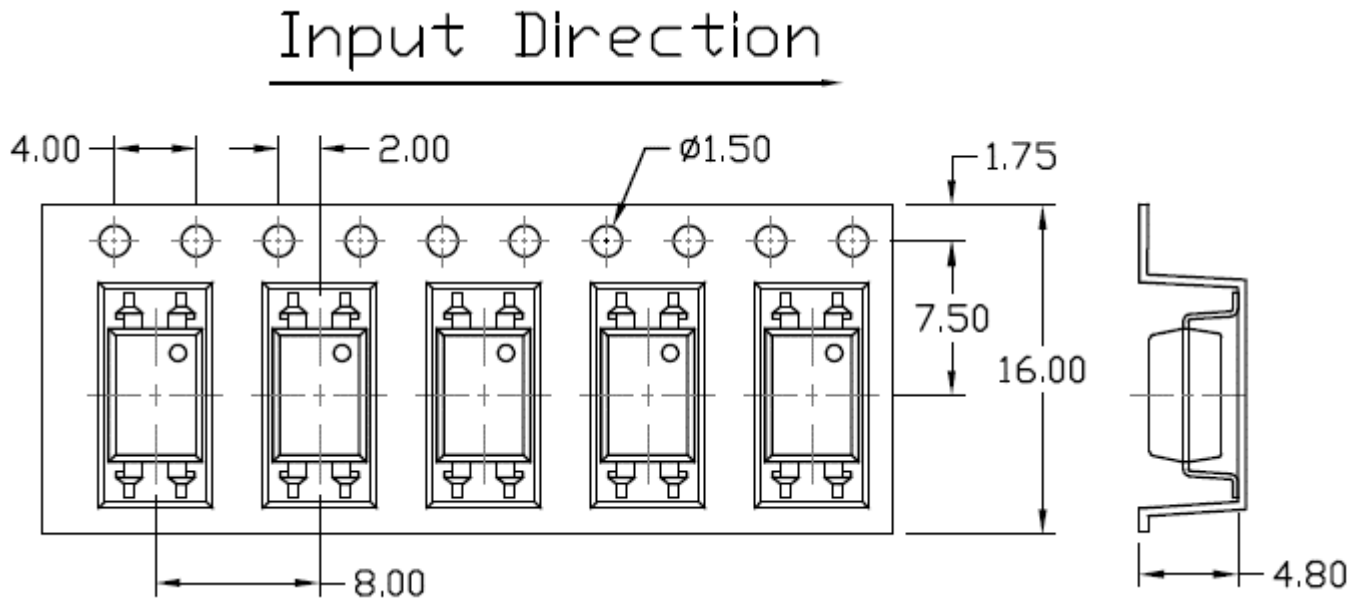
G= Material option (G: Green, None: Non-green)

<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
S(T3)	Surface Mount Lead Forming – With Option 3 Taping	1000 Units/Reel
S(T4)	Surface Mount Lead Forming – With Option 4 Taping	1000 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
SL(T3)	Surface Mount (Low Profile) Lead Forming– With Option 3 Taping	1000 Units/Reel
SL(T4)	Surface Mount (Low Profile) Lead Forming – With Option 4 Taping	1000 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

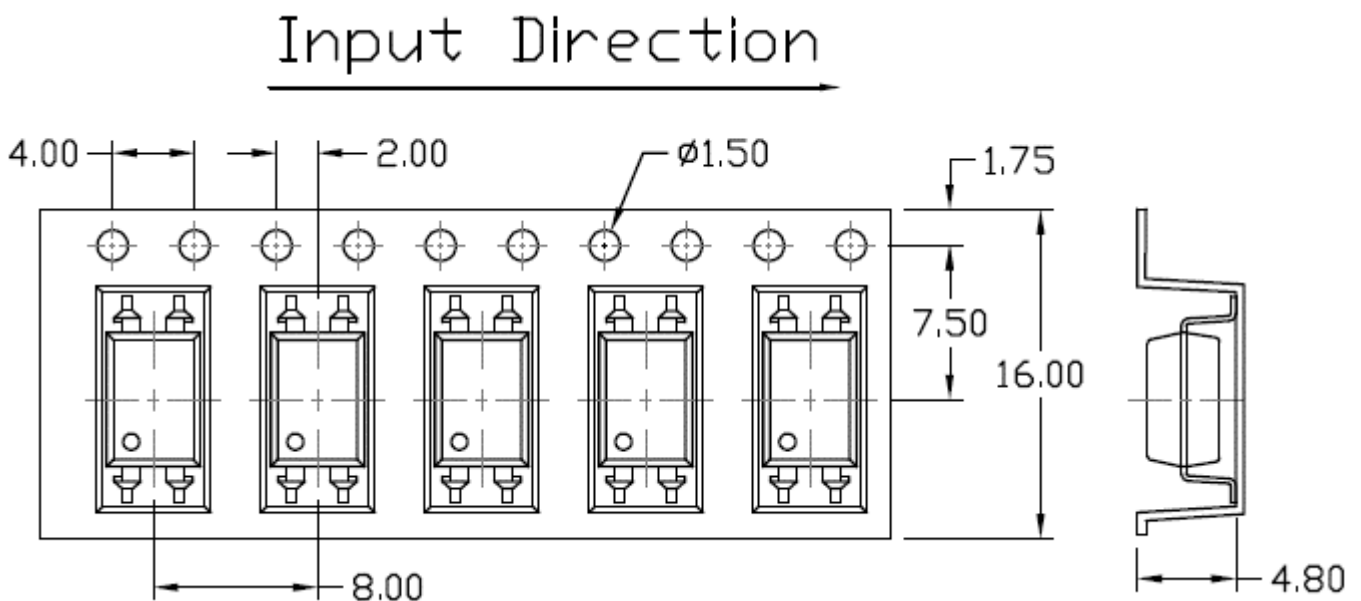


**Carrier Tape Specifications** *Dimensions in mm unless otherwise stated*

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

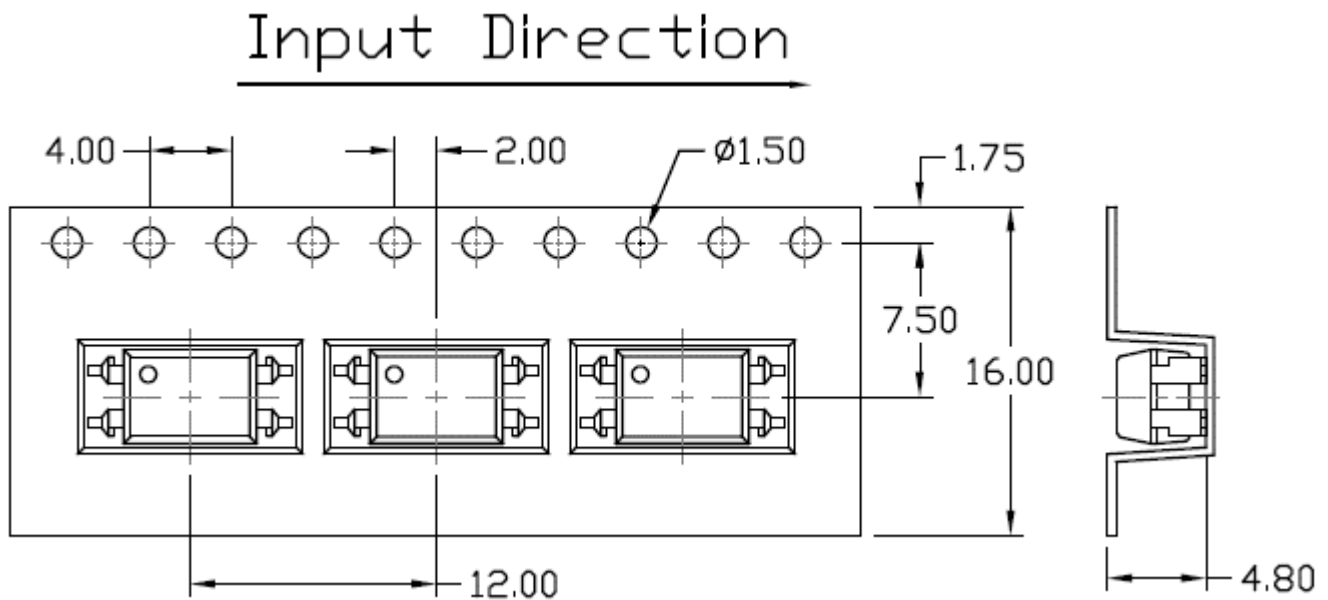


**Option S(T2) & SL(T2)**

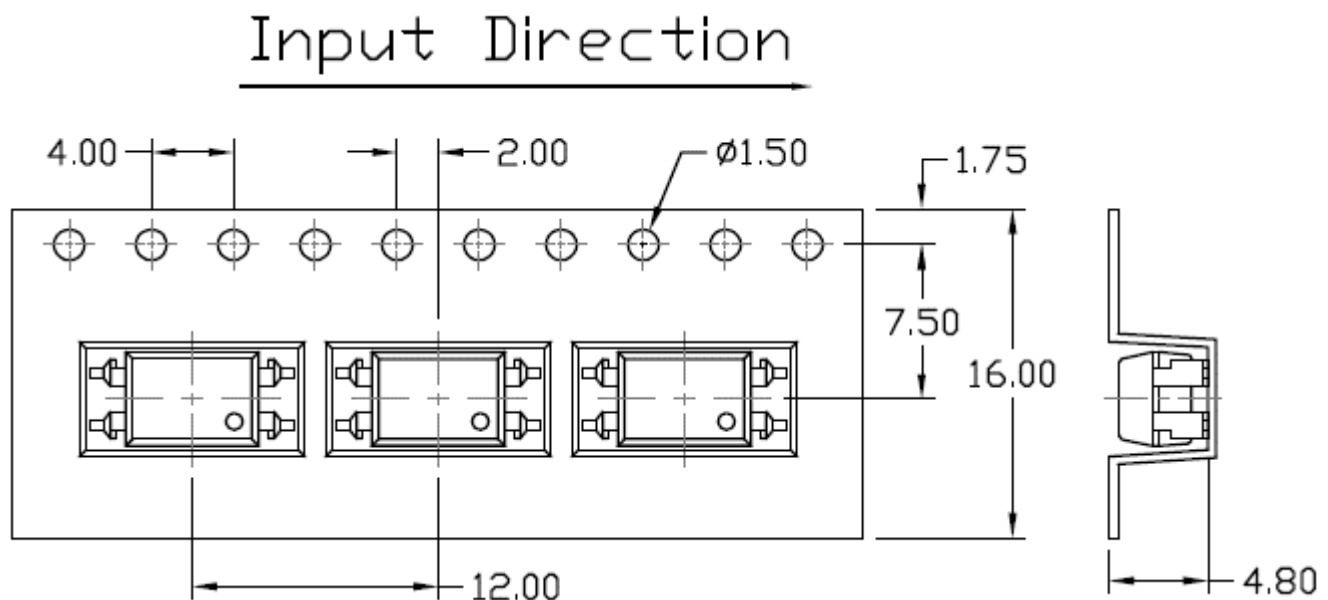




Option S(T3) & SL(T3)



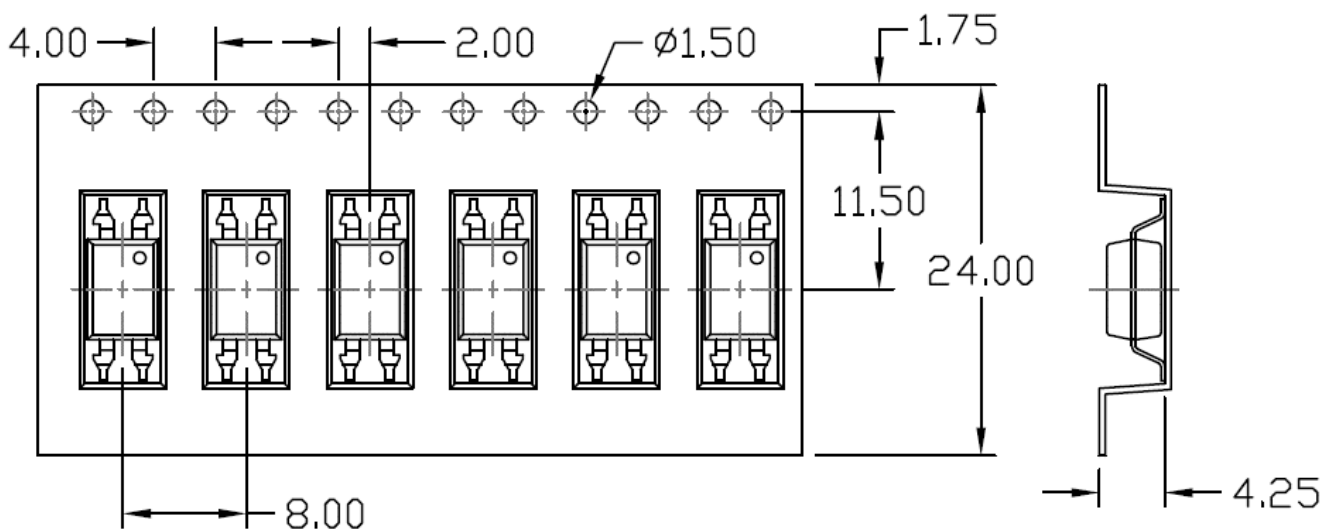
Option S(T4) & SL(T4)





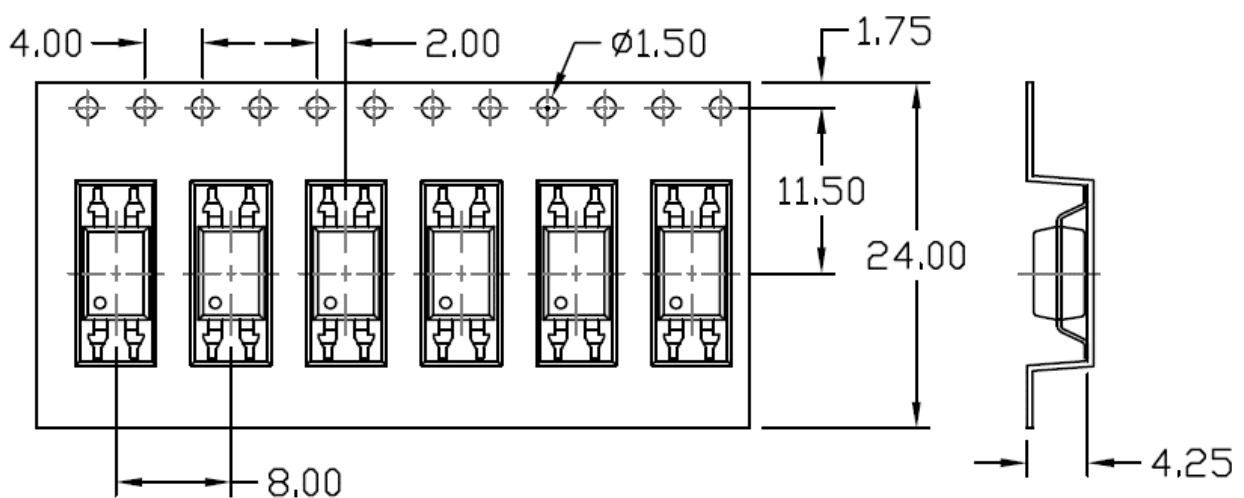
Option SLM(T1)

Input Direction



Option SLM(T2)

Input Direction





### Wave soldering (follow the JEDEC standard JESD22-A111)

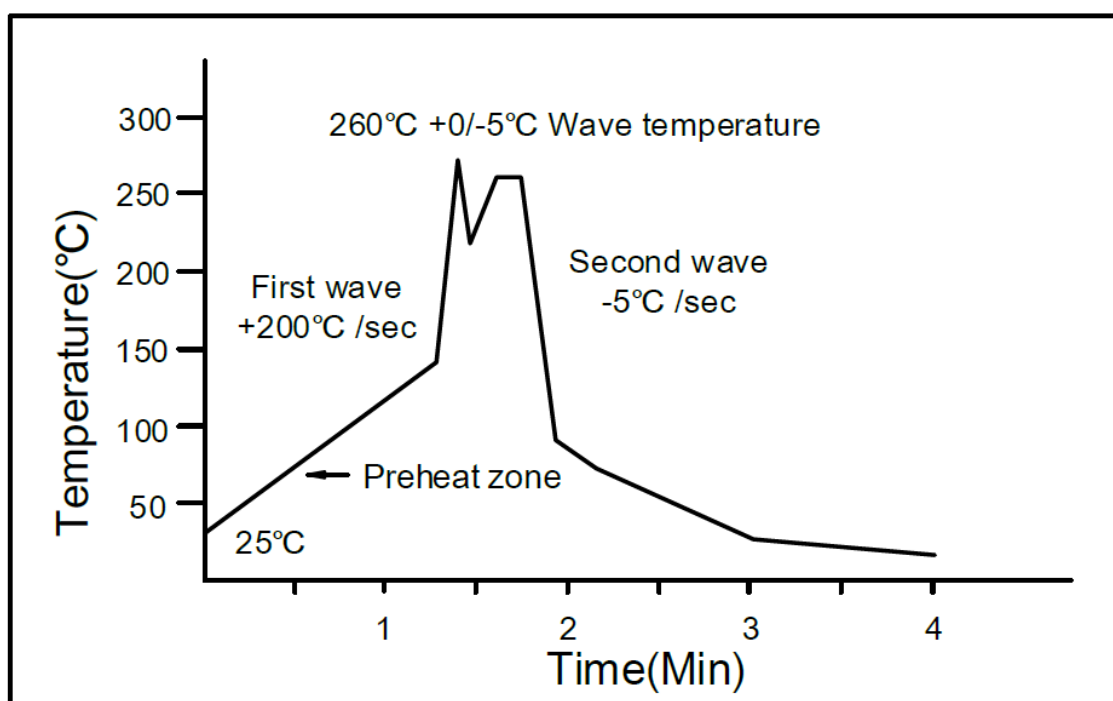
One time soldering is recommended within the condition of temperature.

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

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)

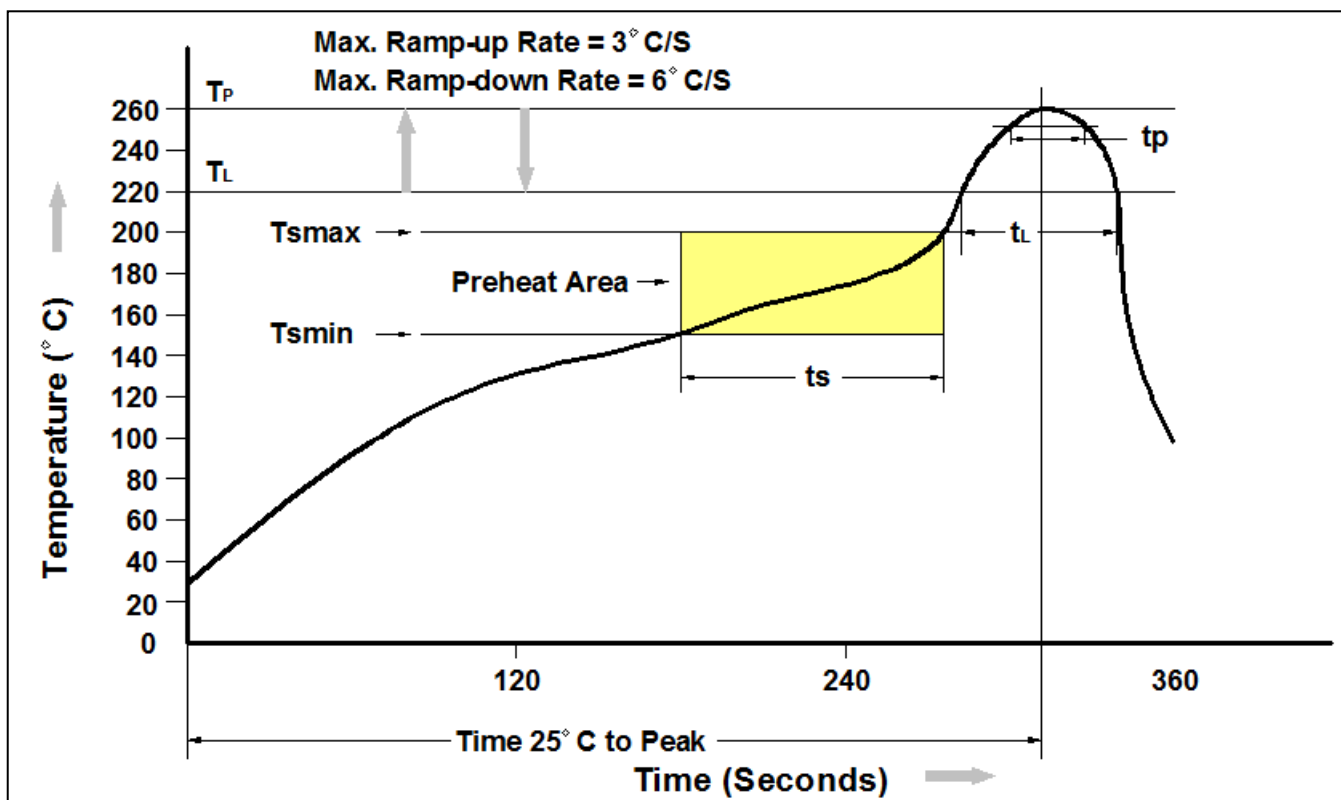
Allow single lead soldering in every single process.

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

Time: 5 sec max.



Reflow Profile



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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