CT816 Series

DC Input 4-Pin Phototransistor Optocoupler

Features

- High isolation 5000 VRMS
- CTR flexibility available see order information
- DC input with transistor output
- External Creepage ≥ 7.4mm
- Distance Through Isolation ≥ 0.4mm
- Spatial Distance ≥ 7.5mm (S/SL Type)
- Spatial Distance ≥ 8.0mm (M/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

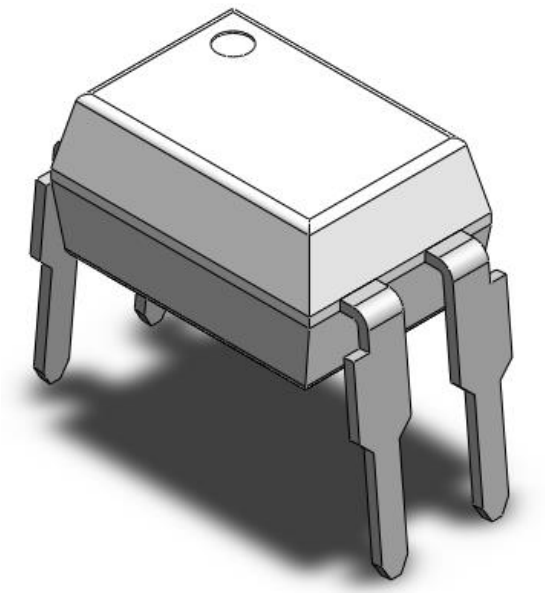
Description

The CT816 series consists of a photo transistor optically coupled to a gallium arsenide Infrared-emitting diode in a 4-lead DIP package with bending options.

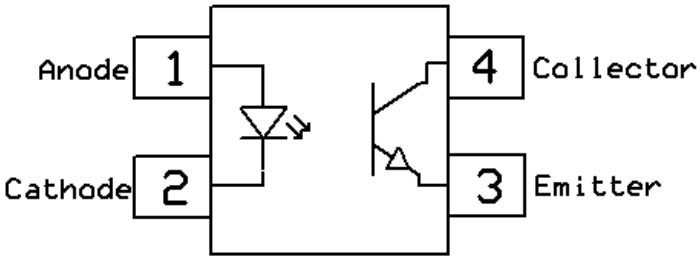
Applications

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

Package Outline



Schematic



Absolute Maximum Rating at 25°C

Symbol	*Parameters*	*Ratings*	*Units*	*Notes*
V_{ISO}	Isolation voltage (AC, 1 minute)	5000	V_{RMS}	
P_{TOT}	Total power dissipation	200	mW	
T_{OPR}	Operating temperature	-55 ~ +110	°C	
T_{STG}	Storage temperature	-55 ~ +150	°C	
T_{SOL}	Soldering temperature	260	°C	
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_D	Detector 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	-	1.24	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= 100μA	80	-	-	V	
B_{VECO}	Emitter-Collector Breakdown	I_E= 100μA	6	-	-	V	
I_{CEO}	Collector-Emitter Dark Current	V_{CE}= 20V, I_F=0mA	-	-	100	nA	

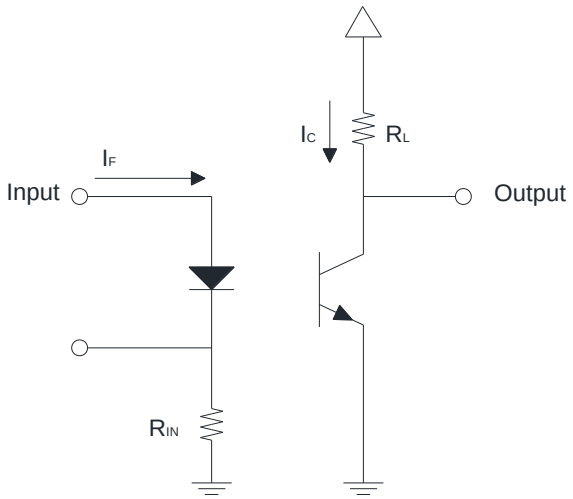
Transfer Characteristics

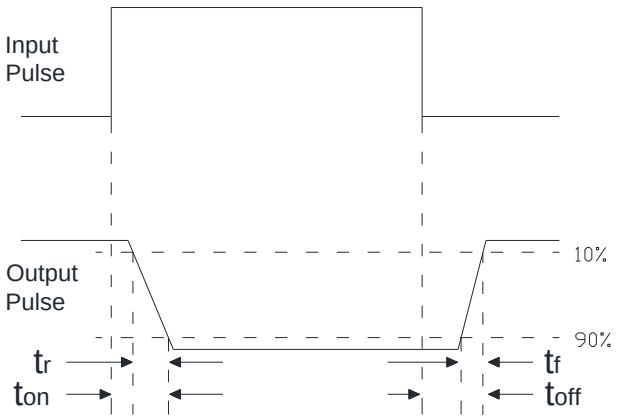
Symbol	Parameters		Test Conditions	Min	Typ	Max	Units	Notes
CTR	Current Transfer Ratio	CT816	I_F= 5mA, V_{CE}= 5V	50	-	600	%	
		CT816A		80	-	160		
		CT816B		130	-	260		
		CT816C		200	-	400		
		CT816D		300	-	600		
		CT816F		100	-	200		
CTR	Current Transfer Ratio	CT816I	I_F= 10mA, V_{CE}= 5V	63	-	125	%	
		CT816J		100	-	200		
		CT816K		160	-	320		
		CT816I	I_F= 1mA, V_{CE}= 5V	22	-	-		
		CT816J		34	-	-		
		CT816K		56	-	-		
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage		I_F= 20mA, I_C= 1mA	-	0.1	0.2	V	
R_{IO}	Isolation Resistance		V_{IO}= 500V_{DC}	$5x10^{10}$	-	-	Ω	
C_{IO}	Isolation Capacitance		f= 1MHz	-	0.25	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	-		

Test Circuit





Typical Characteristic Curves

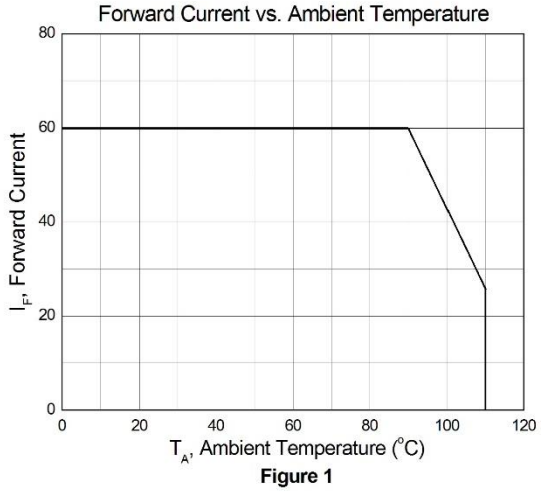


Figure 1

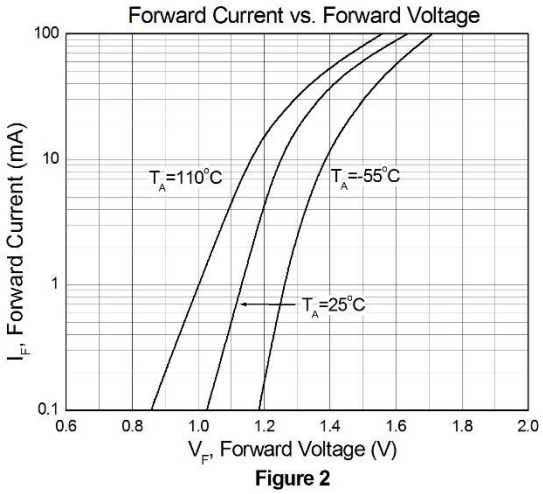


Figure 2

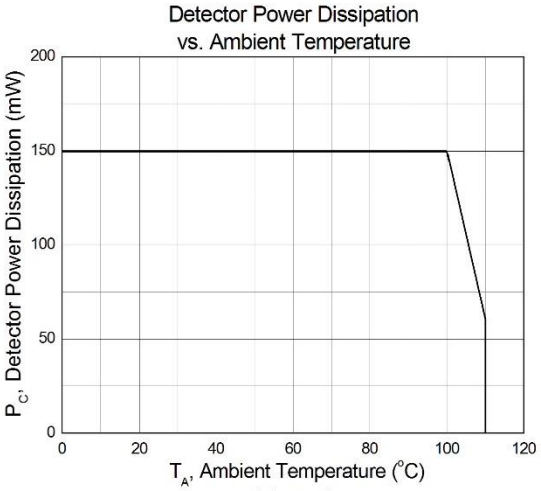


Figure 3

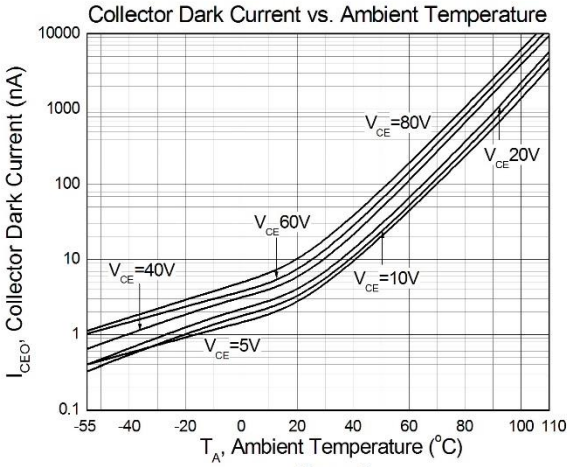


Figure 4

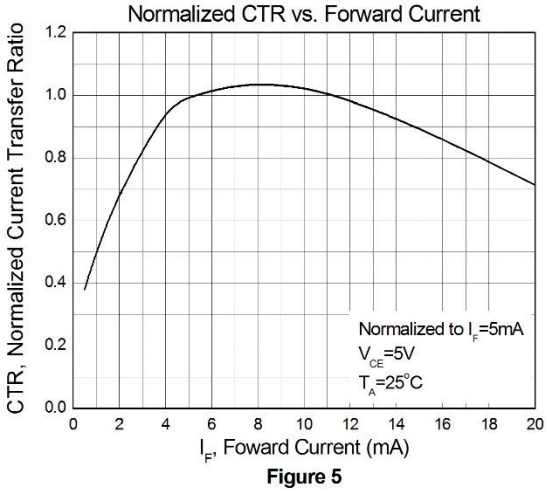


Figure 5

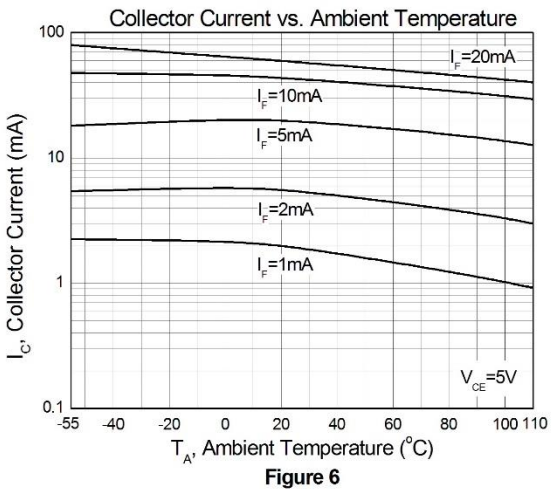


Figure 6

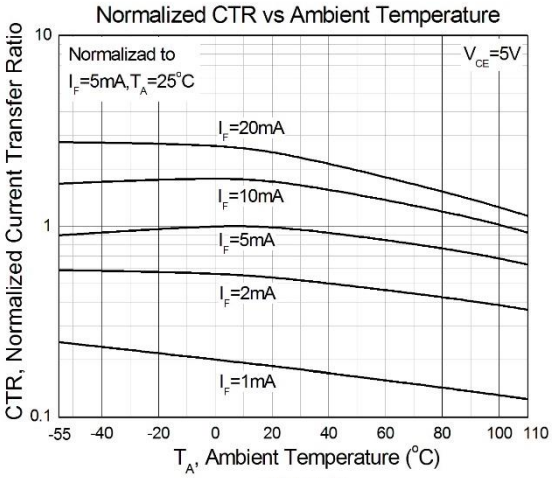


Figure 7

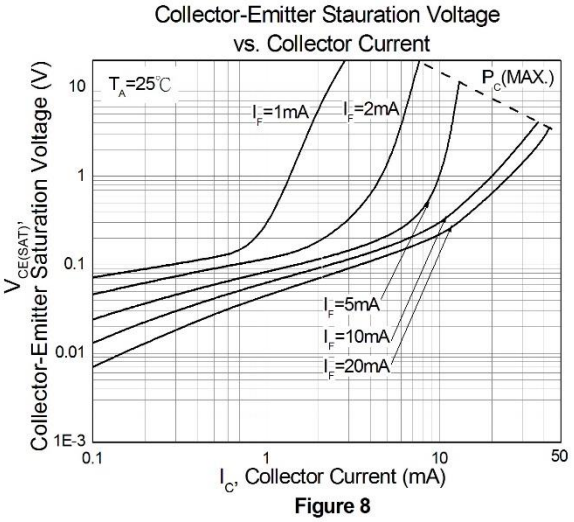


Figure 8

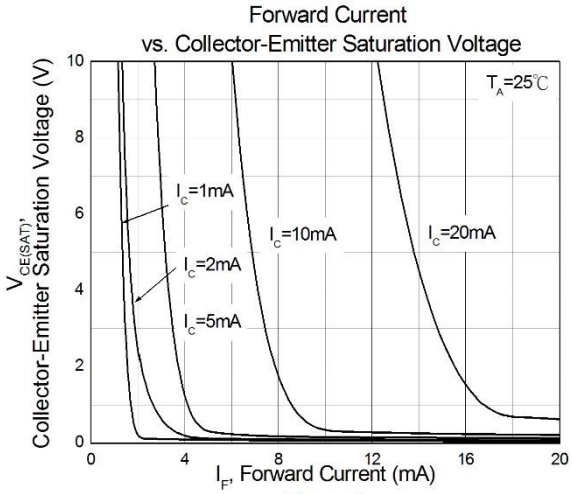


Figure 9

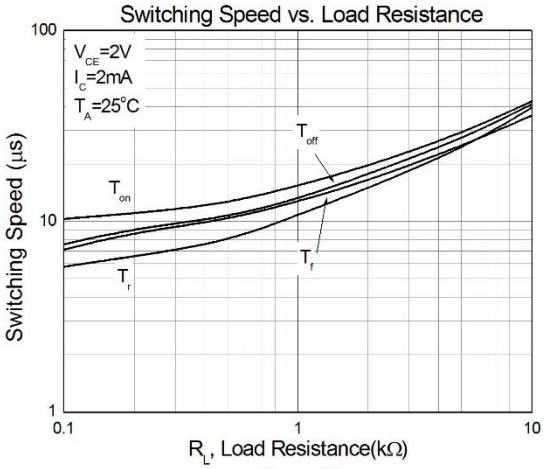


Figure 10

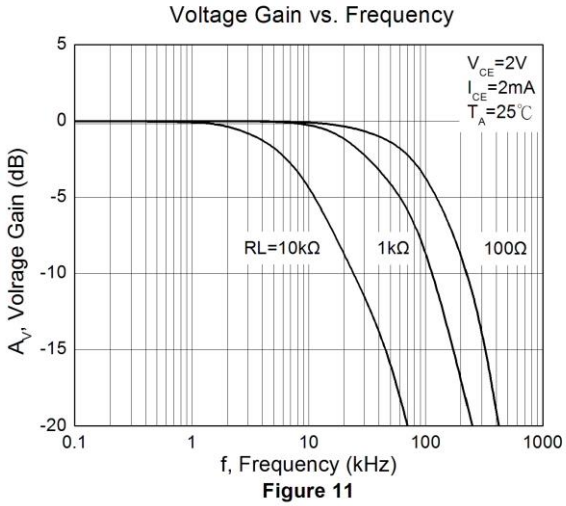
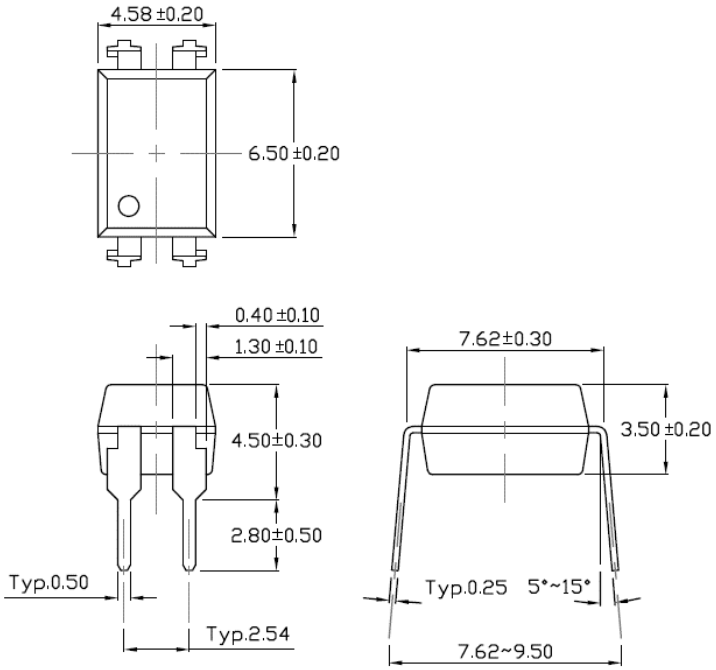


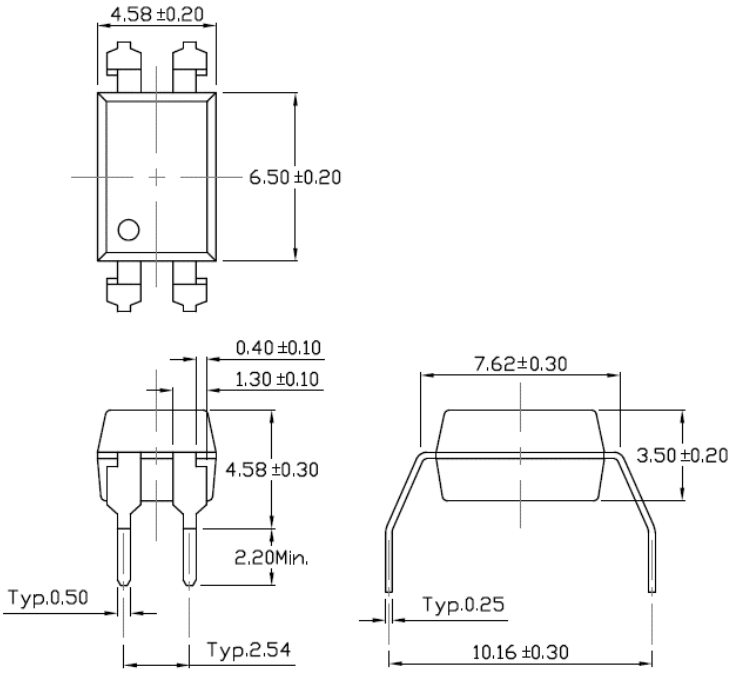
Figure 11

Package Dimension *Dimensions in mm unless otherwise stated*

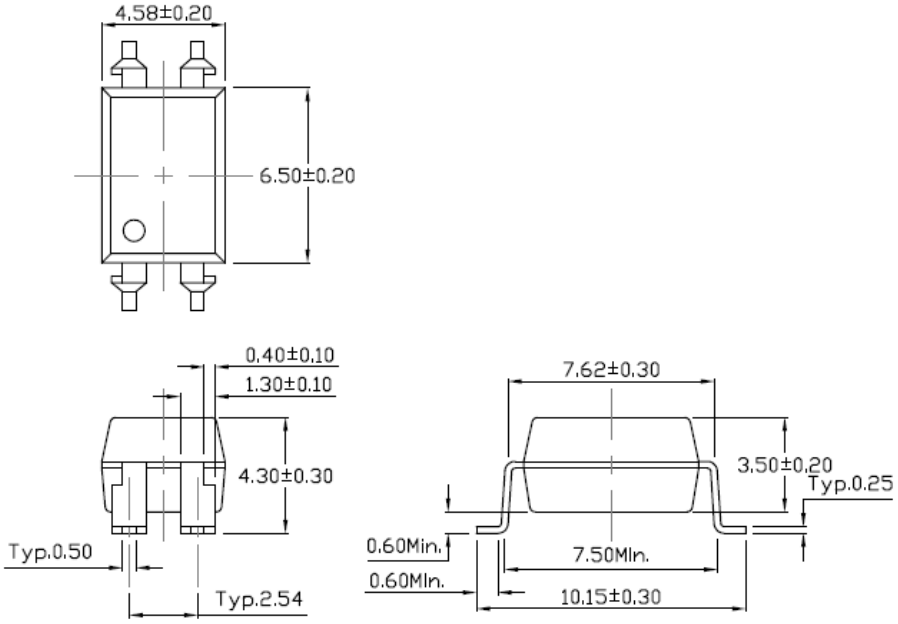
Standard DIP – Through Hole



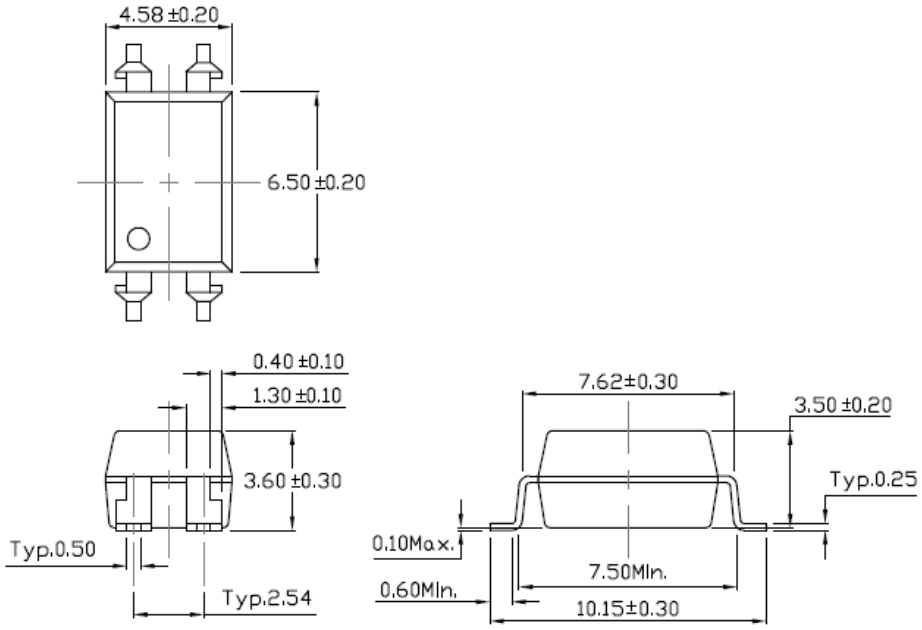
Gullwing (400mil) Lead Forming – Through Hole (M Type)



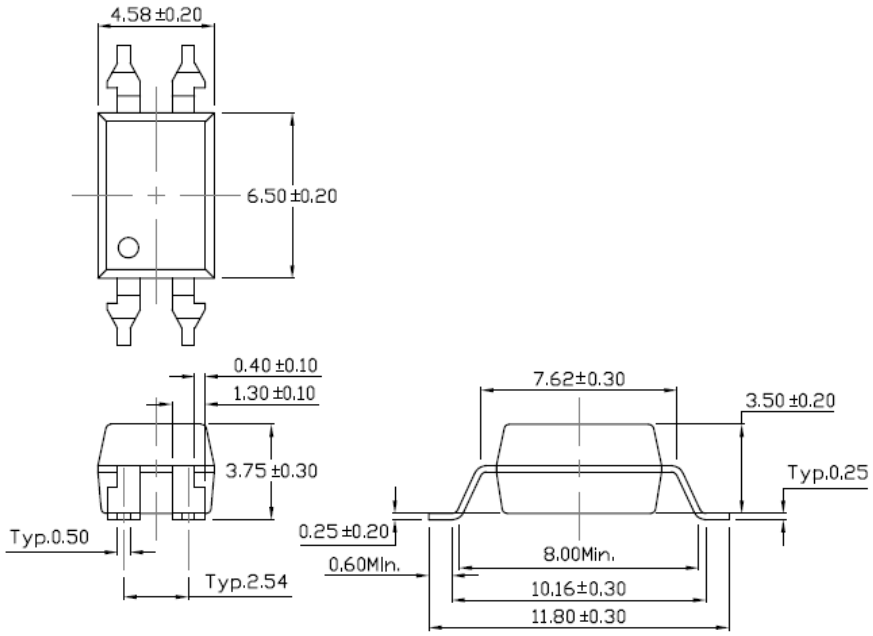
Surface Mount Lead Forming (S Type)



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

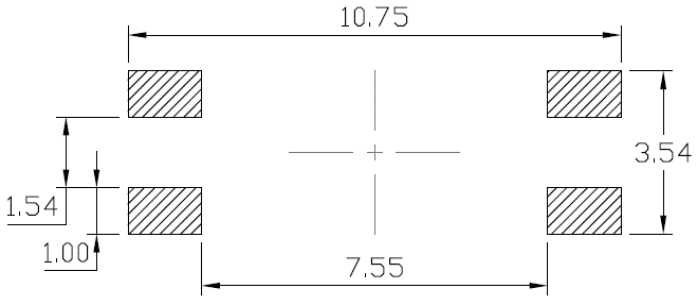


Surface Mount (Gullwing) Lead Forming (SLM Type)

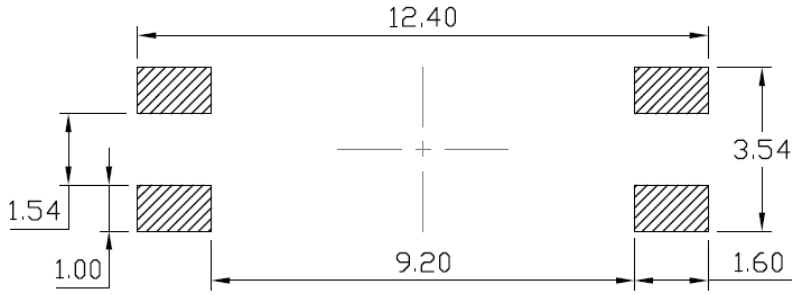


Recommended Solder Mask *Dimensions in mm unless otherwise stated*

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



Surface Mount (Gullwing) Lead Forming



Marking Information

Note:

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

Ordering Information

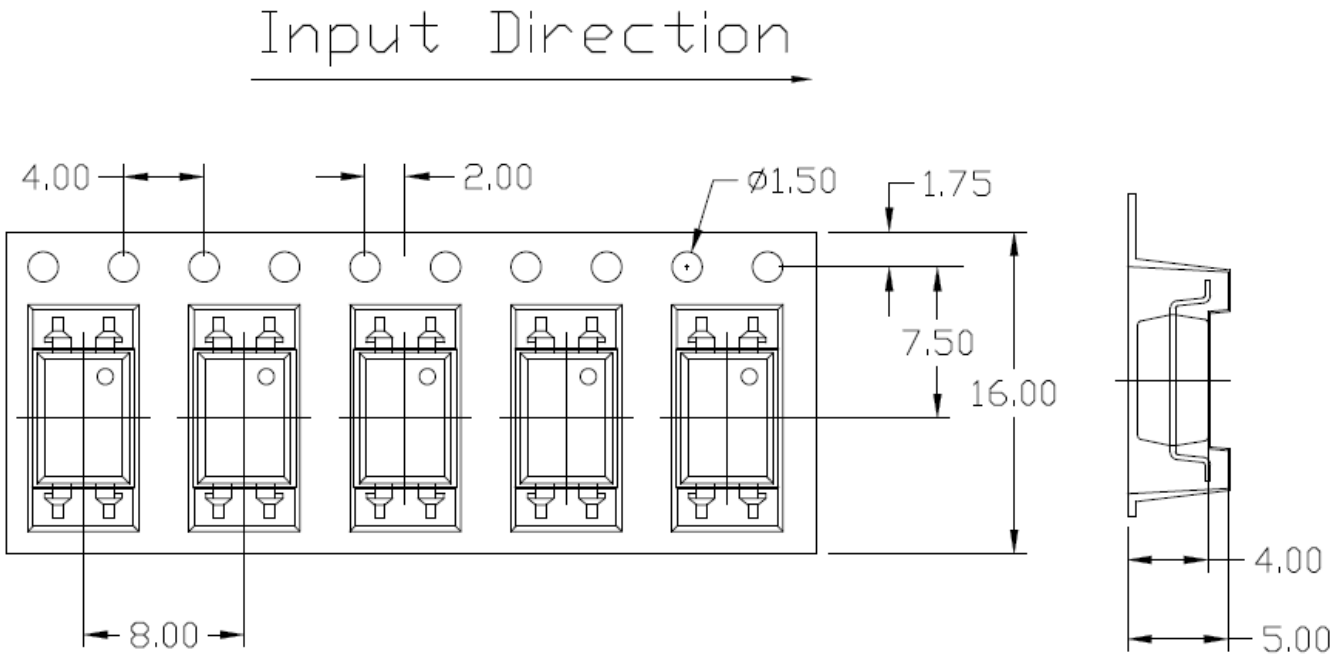
CT816X(V)(Y)(Z)-HG

X = Part No. (X=A, B, C, D, I, J, K, 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)
H = Lead frame option (H: Iron, None: Copper)
G= Material option (G: Green, None: Non-green)

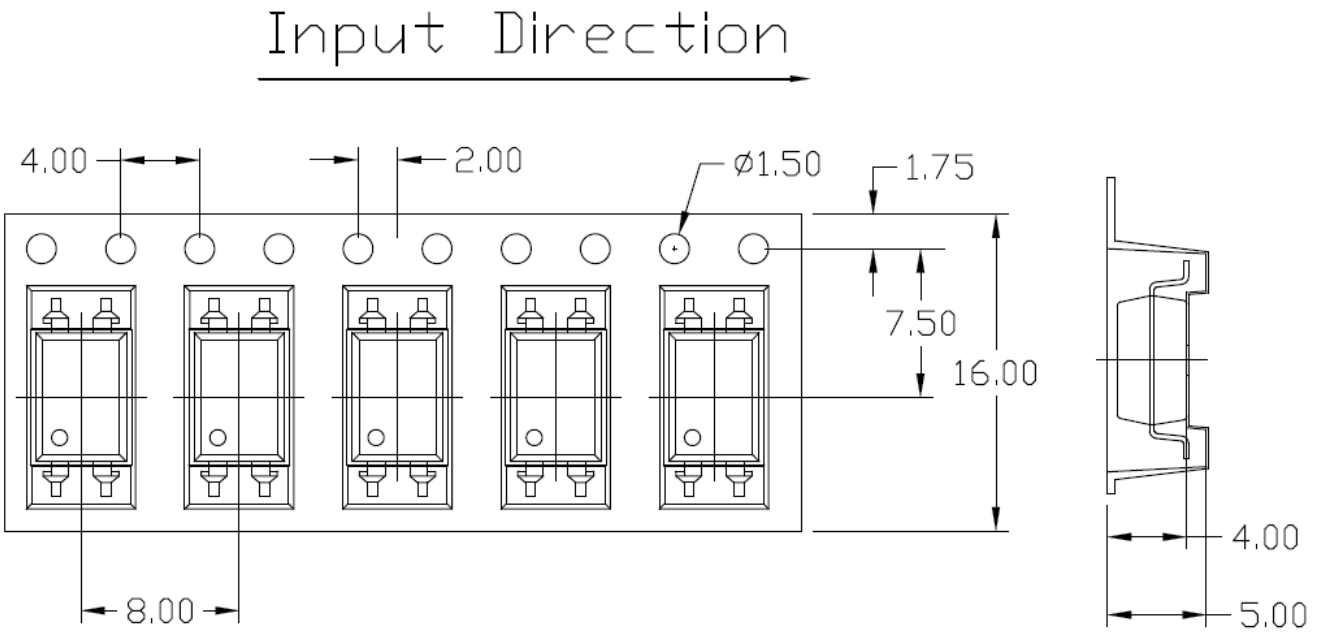
Option	***Description***	***Quantity***
None	Standard 4 Pin DIP	100 Units/Tube
M	Gullwing (400mil) Lead Forming	100 Units/Tube
S(T1)	Surface Mount Lead Forming – With Option 1 Taping	1500 Units/Reel
S(T2)	Surface Mount Lead Forming – With Option 2 Taping	1500 Units/Reel
S(T3)	Surface Mount Lead Forming – 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*

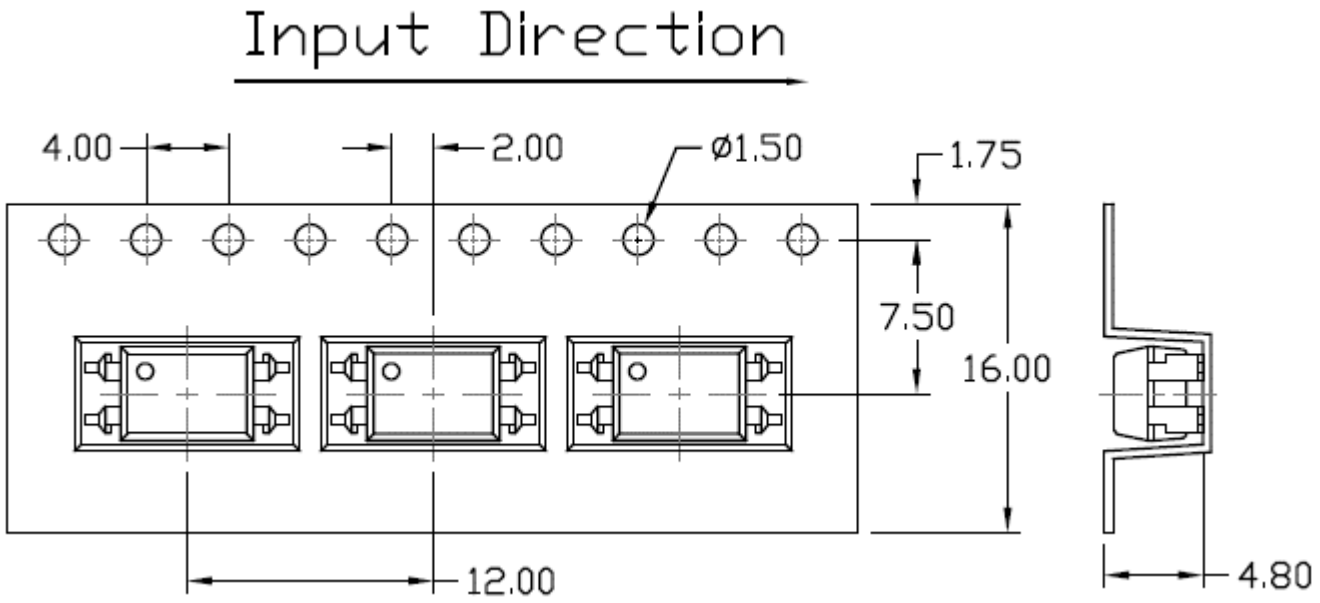
Option S(T1) & SL(T1)



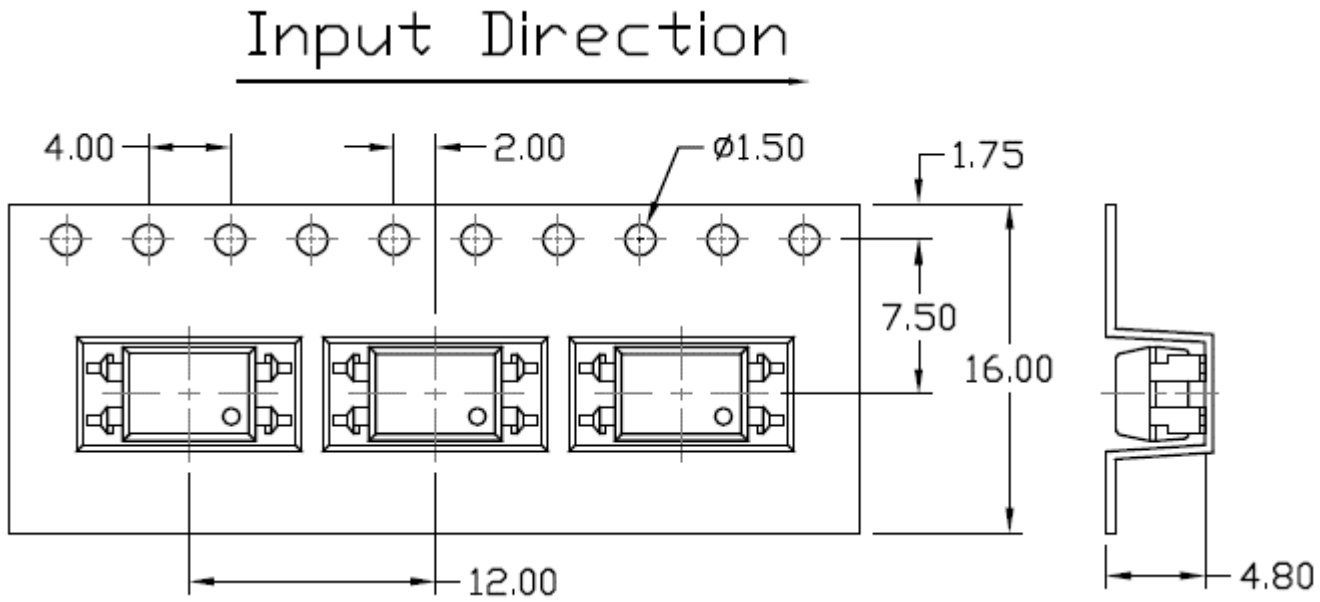
Option S(T2) & SL(T2)



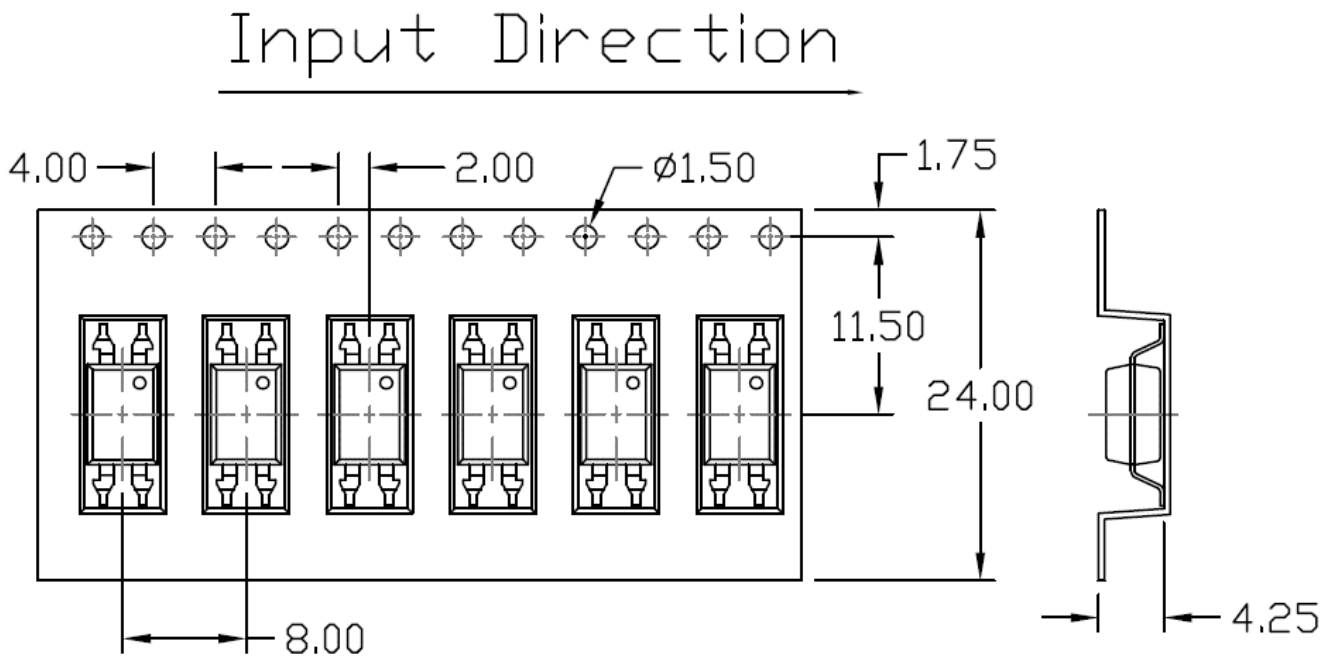
Option S(T3) & SL(T3)



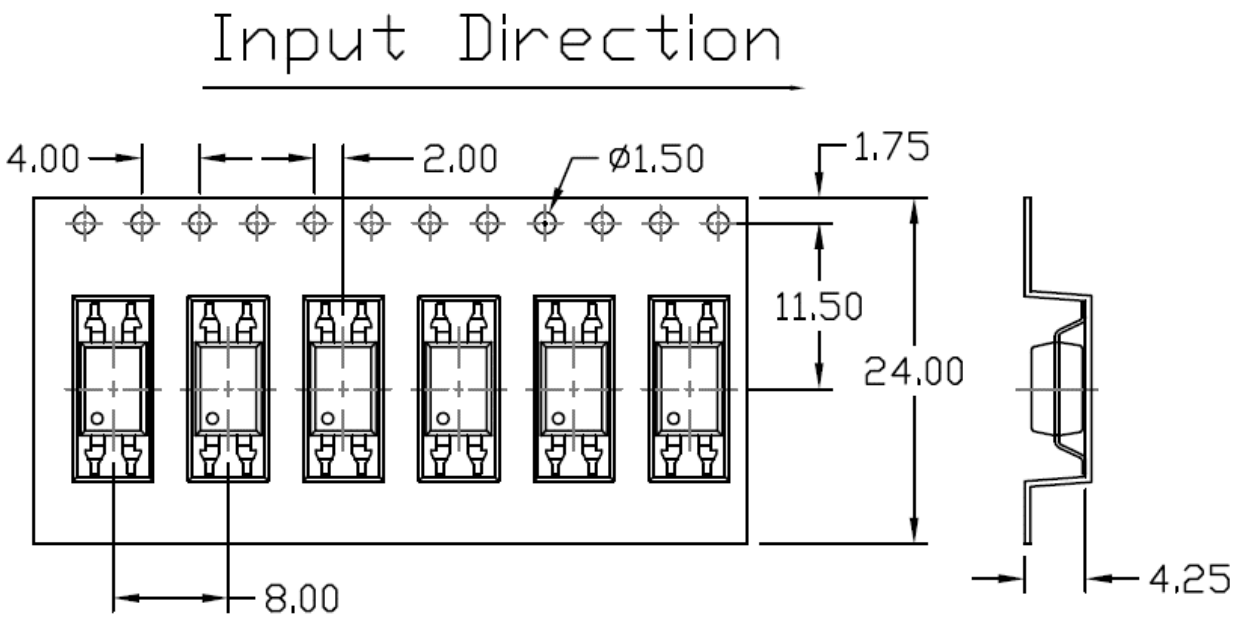
Option S(T4) & SL(T4)



Option SLM(T1)

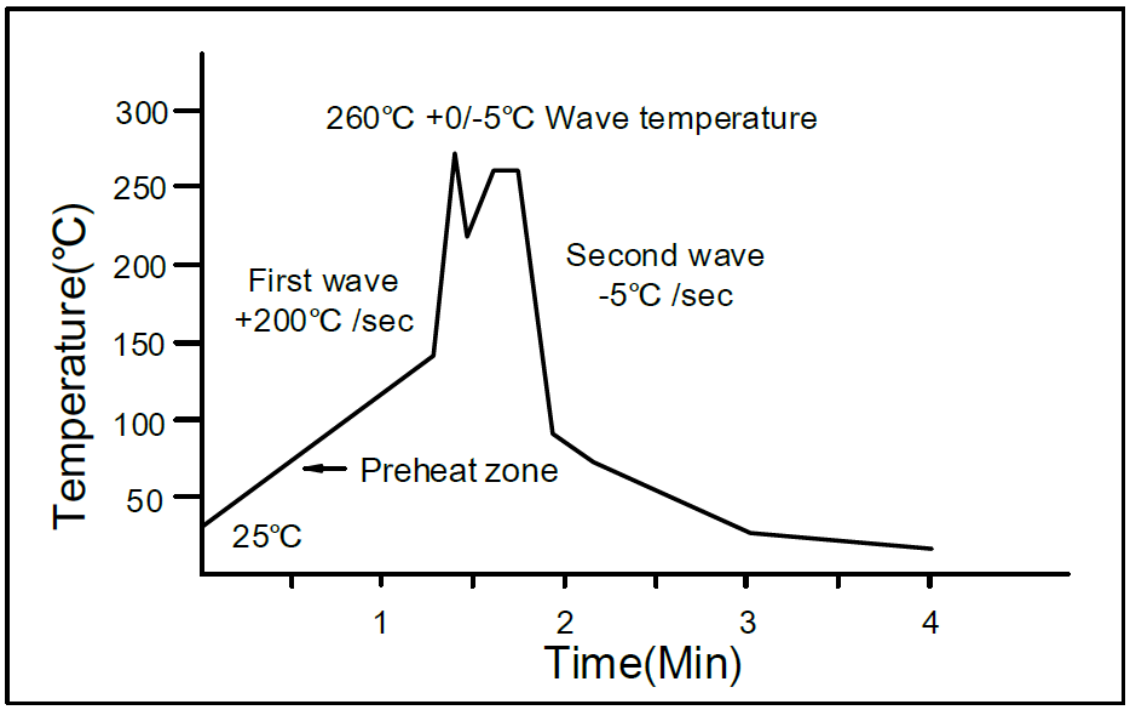


Option SLM(T2)



Wave soldering (follow the JEDEC standard JESD22-A111)

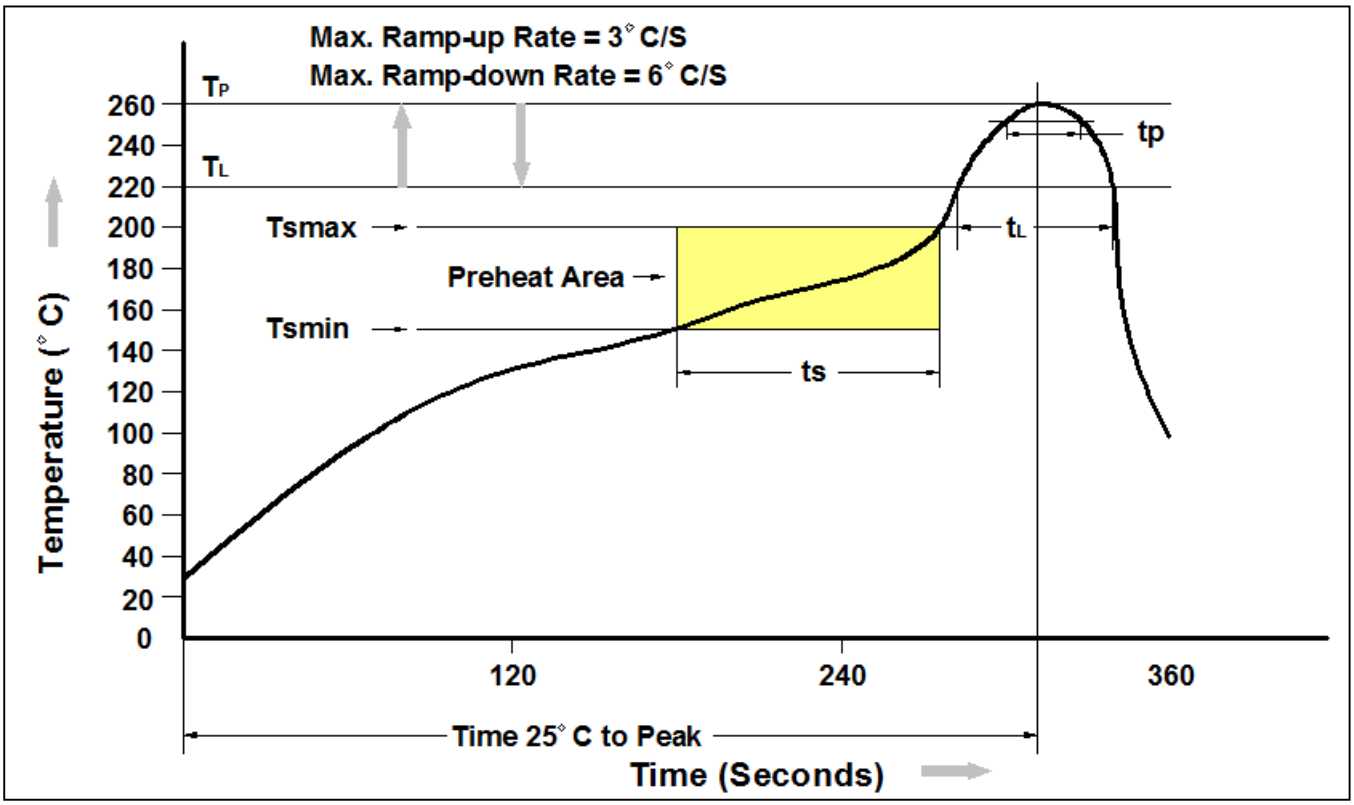
One time soldering is recommended within the condition of temperature.
Temperature: 260+0/-5˚C.
Time: 10 sec.
Preheat temperature:25 to 140˚C.
Preheat time: 30 to 80 sec.



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



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.

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