



Low Dark Current 4-Pin Phototransistor Optocoupler

Features

- High isolation 5000 VRMS
- CTR flexibility available see order information
- DC input with transistor output
- 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

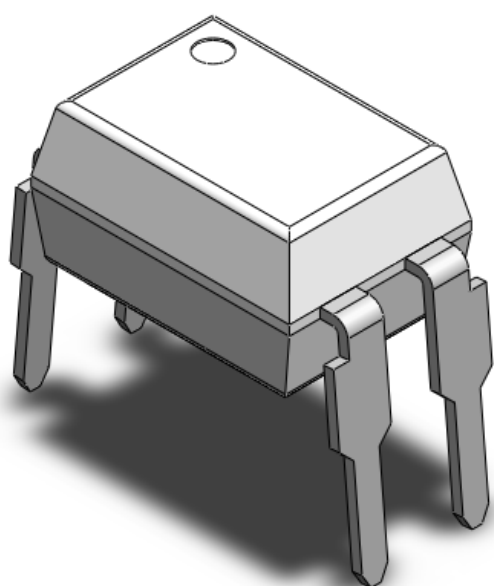
Applications

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

Description

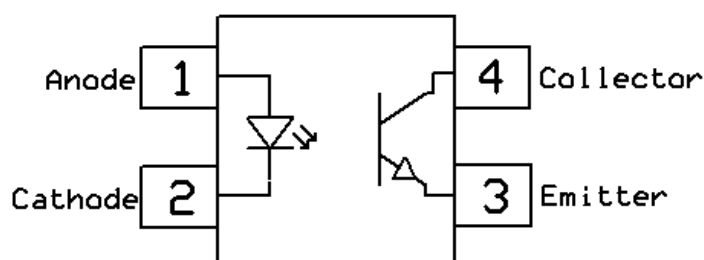
The CT2501 series consists of a phototransistor optically coupled to a gallium arsenide Infrared-emitting diode in a 4-lead DIP package with different lead forming options.

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	5000	V _{RMS}	
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	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 _C	Detector power dissipation	150	mW	
B _{VCEO}	Collector-Emitter Breakdown Voltage	80	V	
B _{VECO}	Emitter-Collector Breakdown Voltage	7	V	
I _C	Collector Current	50	mA	



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	$I_F = 10\text{mA}$		1.2	1.4	V	
I_R	Reverse Current	$V_R = 6\text{V}$	-	-	5	μA	
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	$I_E = 100\mu\text{A}$	7	-	-	V	
I_{CEO}	Collector-Emitter Dark Current	$V_{CE} = 80\text{V}$, $I_F = 0\text{mA}$	-	-	100	nA	

Transfer Characteristics

Symbol	Parameters		Test Conditions	Min	Typ	Max	Units	Notes
CTR	Current Transfer Ratio	CT2501	$I_F = 5\text{mA}$, $V_{CE} = 5\text{V}$	80		400	%	
		CT2501K		300		600		
		CT2501L		200		400		
		CT2501M		80		240		
		CT2501D		100		300		
		CT2501H		80		160		
		CT2501W		130		260		
		CT2501Q		100		200		
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage		$I_F = 20\text{mA}$, $I_C = 1\text{mA}$	-	0.1	0.2	V	
R_{IO}	Isolation Resistance		$V_{IO} = 1\text{kV}_{DC}$	10^{11}			Ω	
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	$V_{CC} = 10\text{V}$, $I_C = 2\text{mA}$, $R_L = 100\Omega$	-	3	-	μs	
t_f	Fall Time		-	5	-		



Typical Characteristic Curves

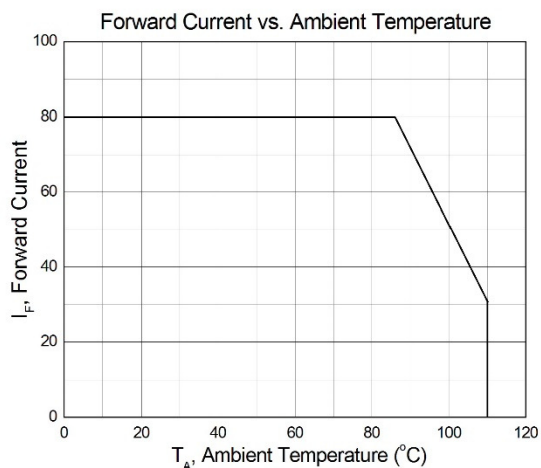


Figure 1

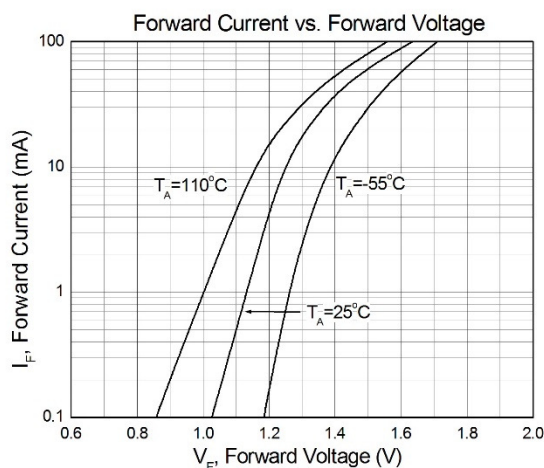


Figure 2

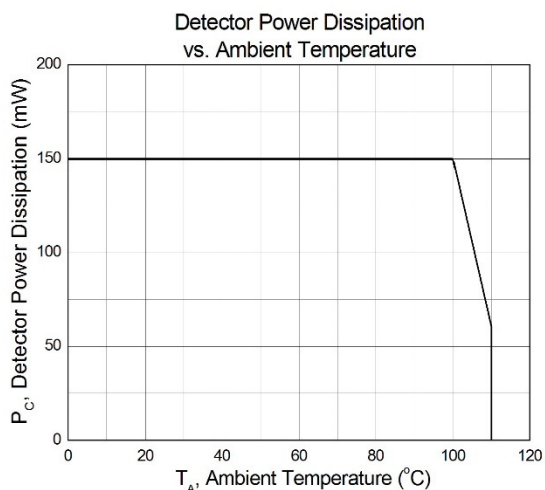


Figure 3

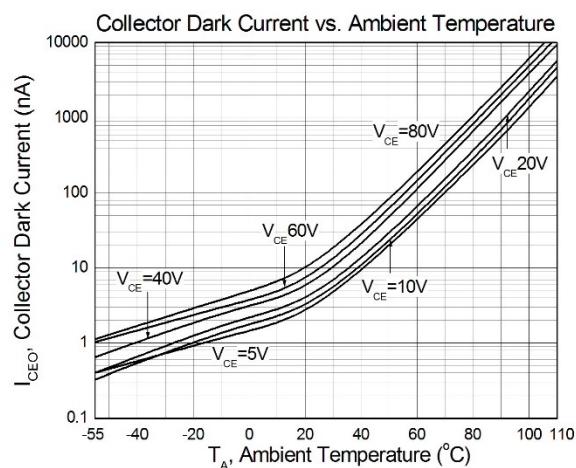


Figure 4

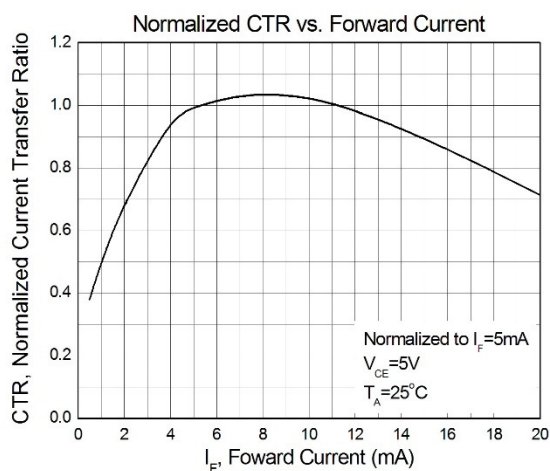


Figure 5

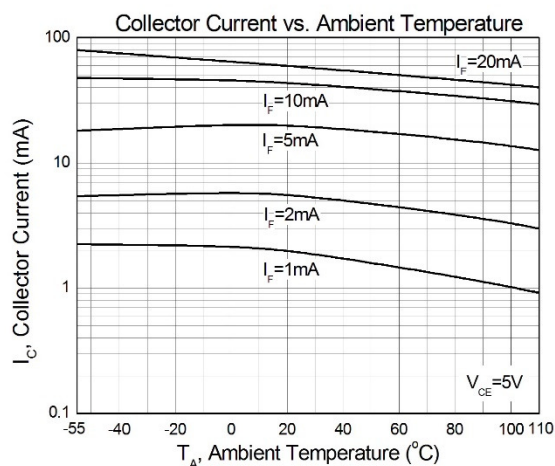
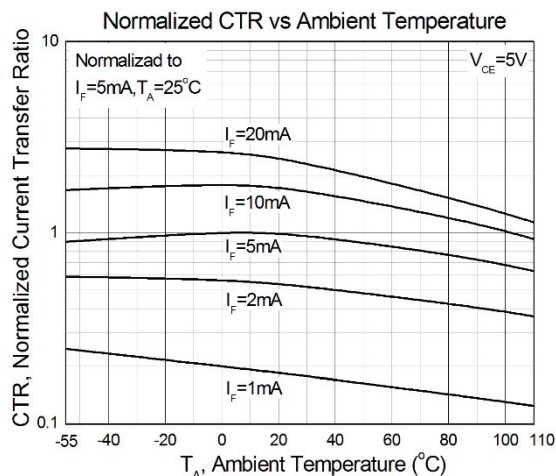
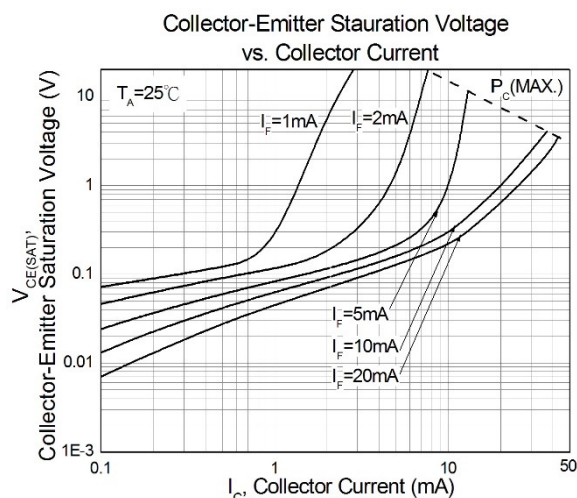
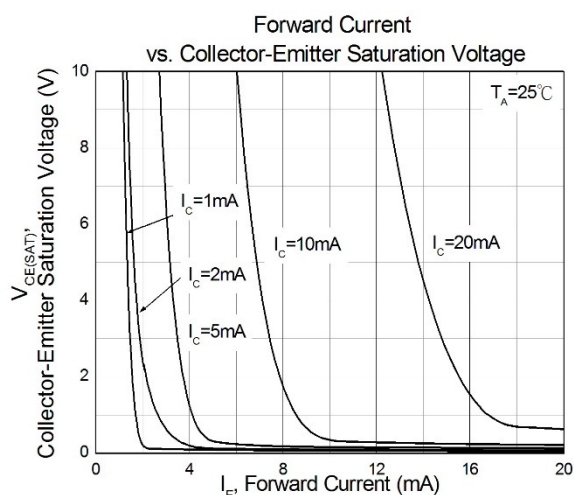
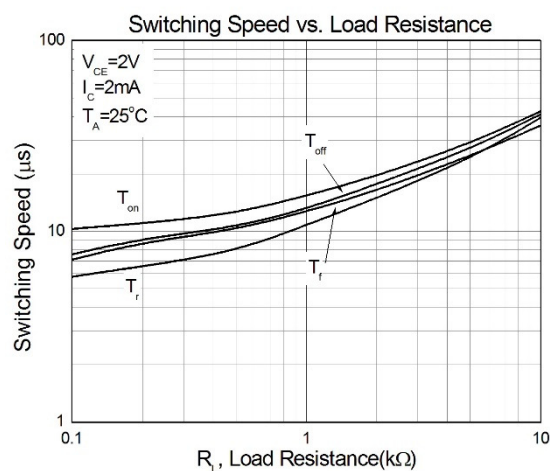
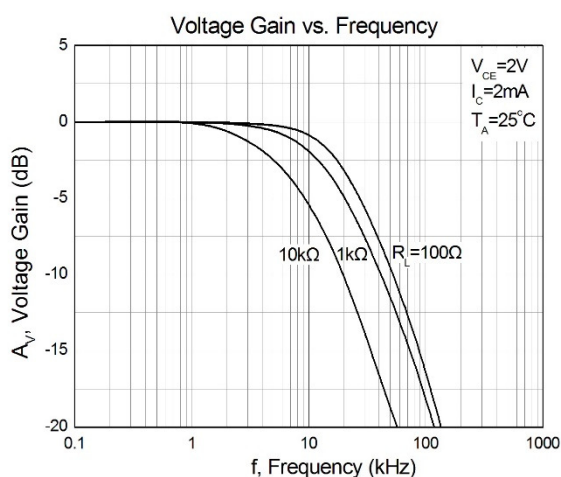


Figure 6

**Low Dark Current 4-Pin Phototransistor Optocoupler****Figure 7****Figure 8****Figure 9****Figure 10****Figure 11**



Test Circuit

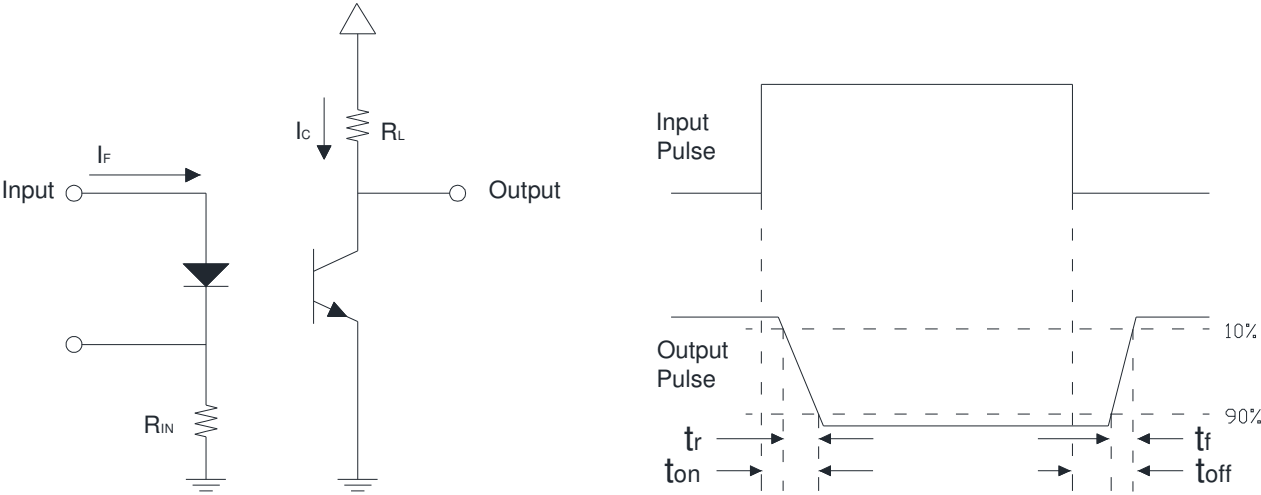


Figure 12: Switching Time Test Circuits

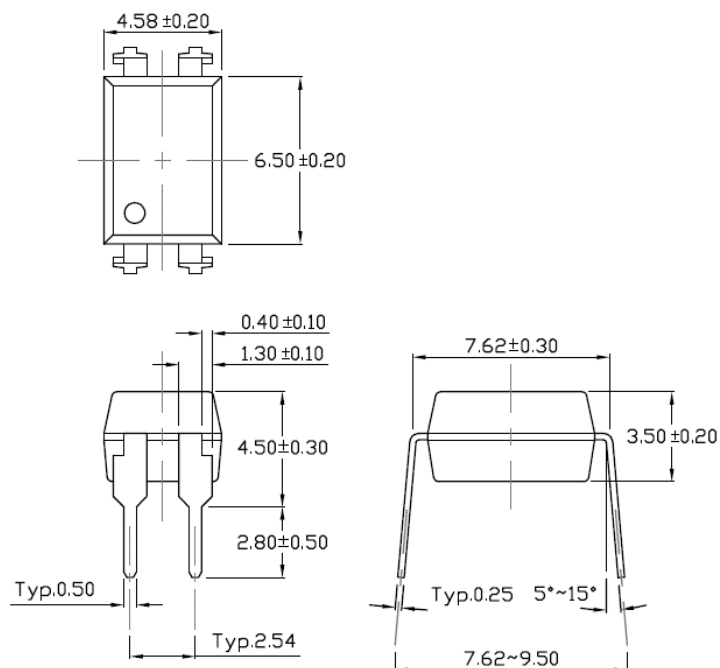


CT2501 Series

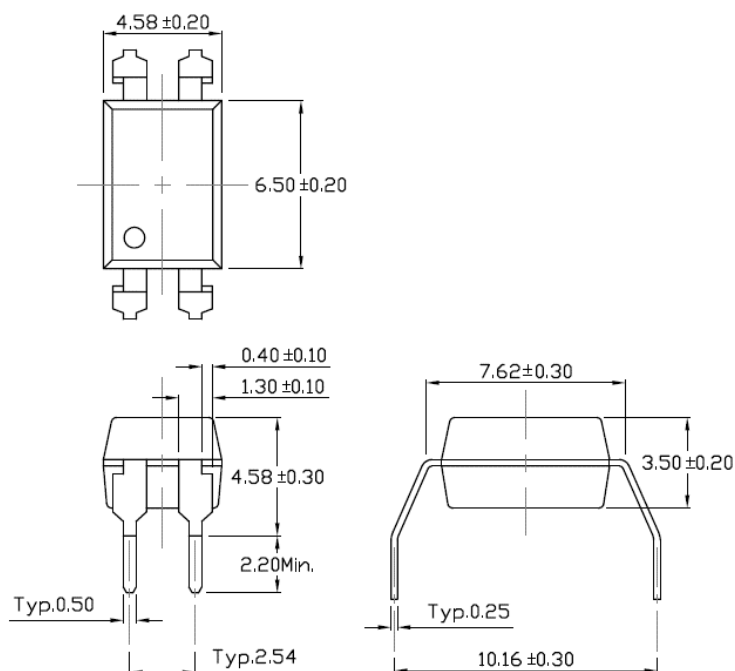
Low Dark Current 4-Pin Phototransistor Optocoupler

Package Dimension *Dimensions in mm unless otherwise stated*

Standard DIP – Through Hole

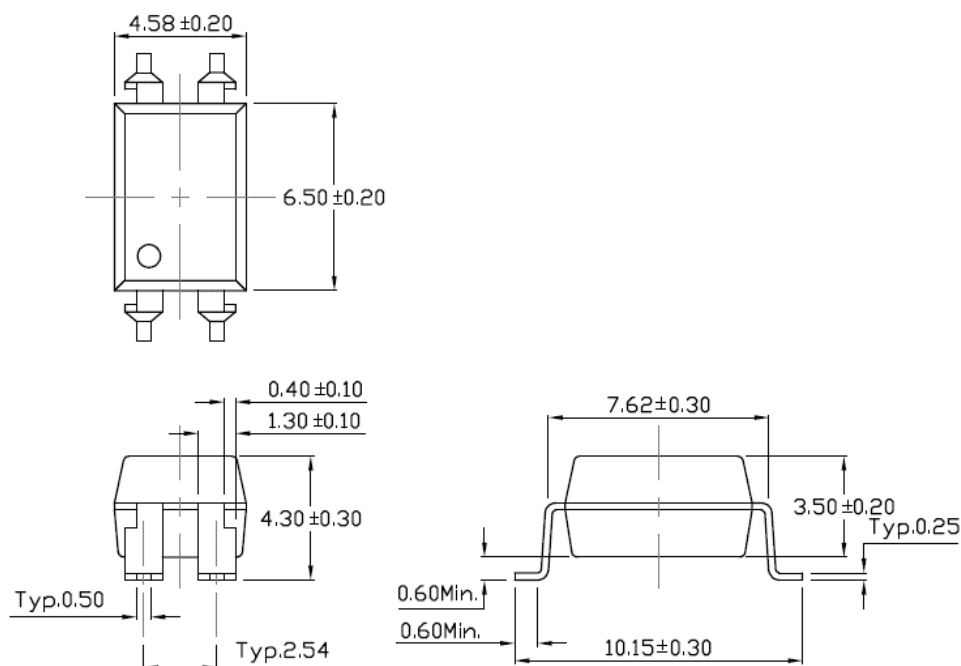


Gullwing (400mil) Lead Forming – Through Hole (M Type)

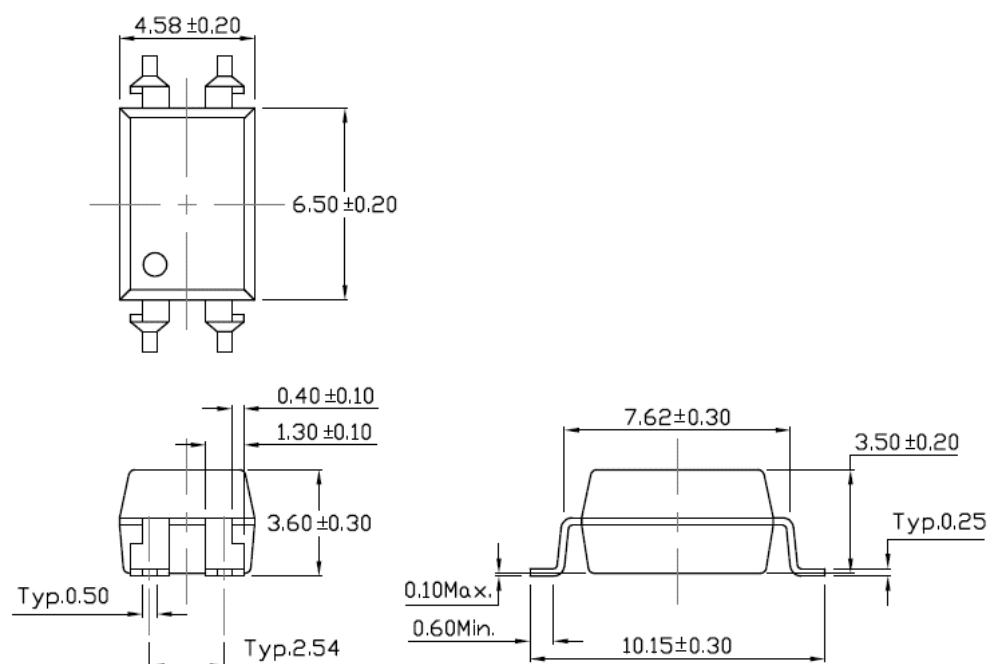




Surface Mount Lead Forming (S Type)



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

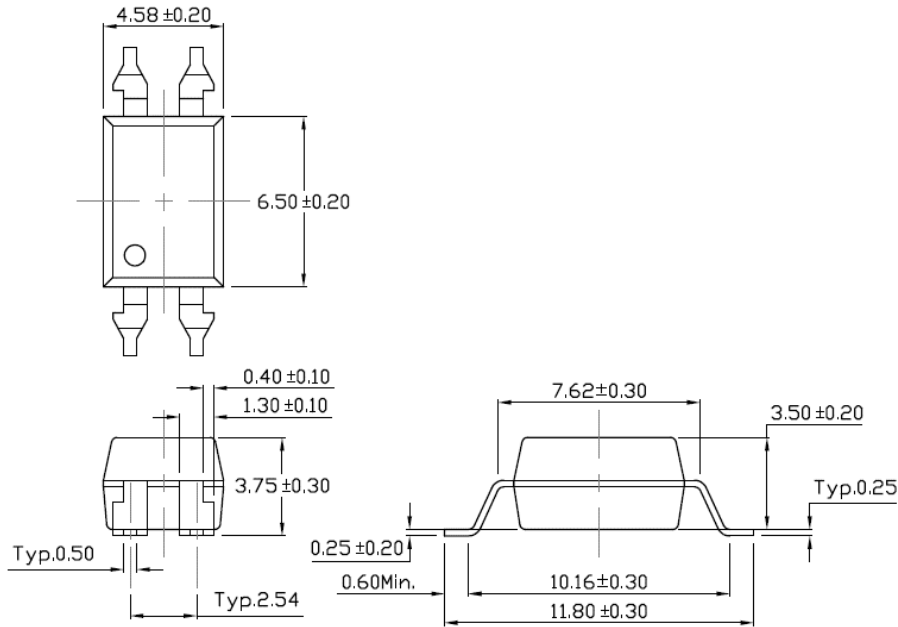




CT2501 Series

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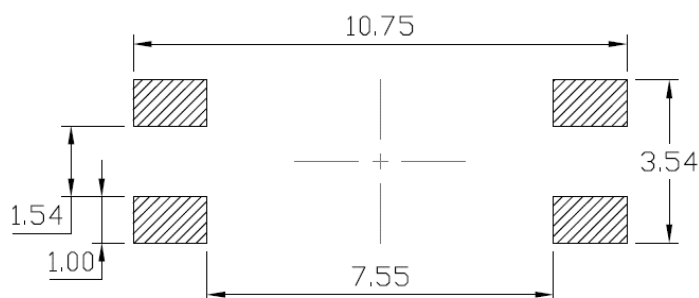
Surface Mount (Gullwing) Lead Forming (SLM Type)



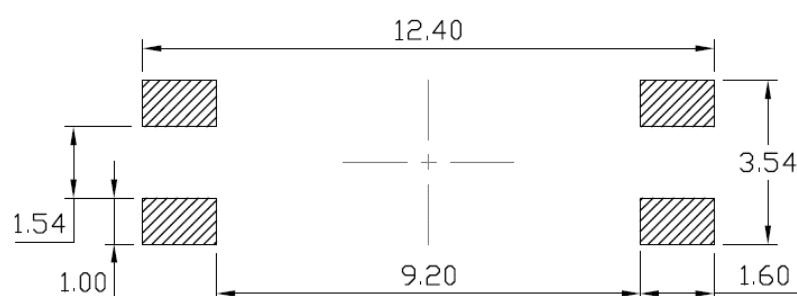


Recommended Solder Mask Dimensions in mm unless otherwise stated

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



Surface Mount (Gullwing) Lead Forming



Marking Information



Note:

- CT : Denotes "CT Micro"
- 2501 : Part Number
- R : CTR Rank
- V : VDE Option
- Y : Fiscal Year
- WW : Work Week
- K : Manufacturing Code



Ordering Information**CT2501X(V)(Y)(Z)-HG**

X = Part No. (X=L,M,D,H,W, 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)

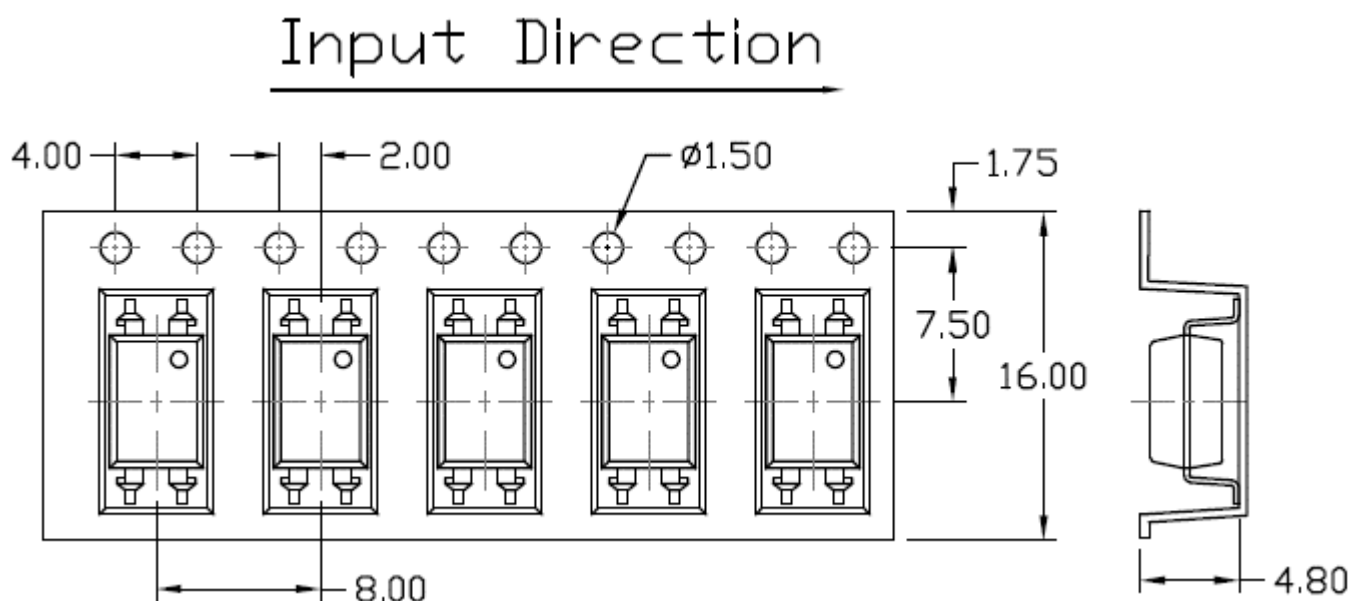
G= Material option (G: Green, None: Non-green)

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

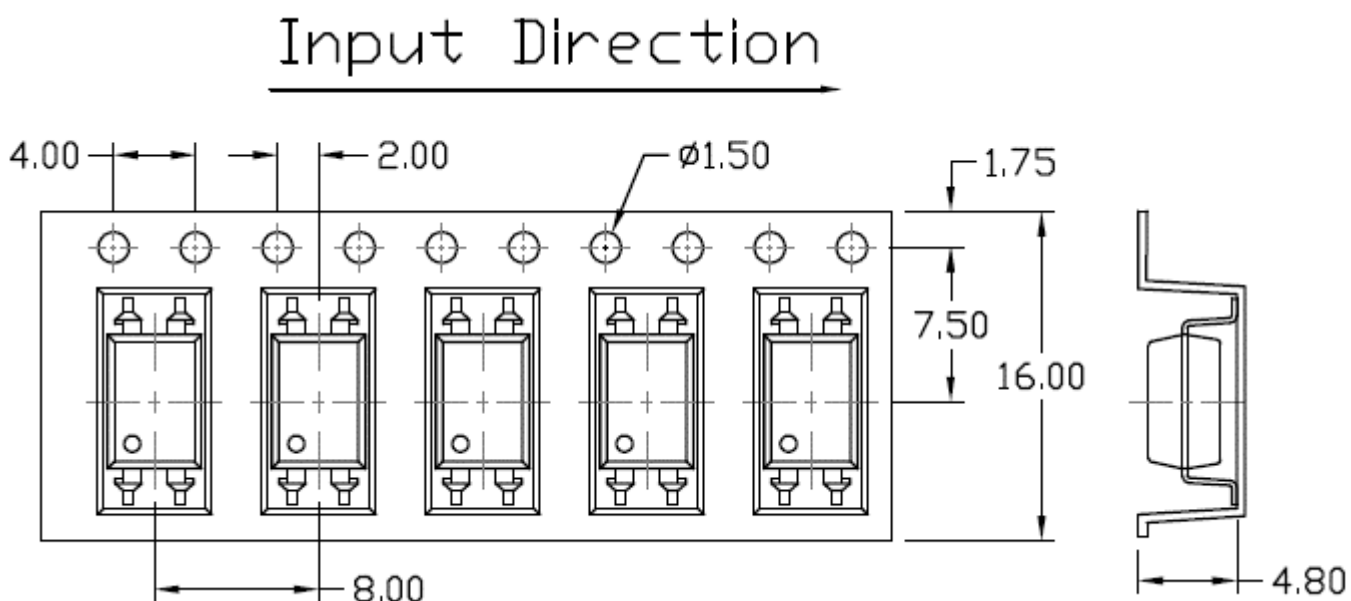


Carrier Tape Specifications *Dimensions in mm unless otherwise stated*

Option S(T1) & SL(T1)



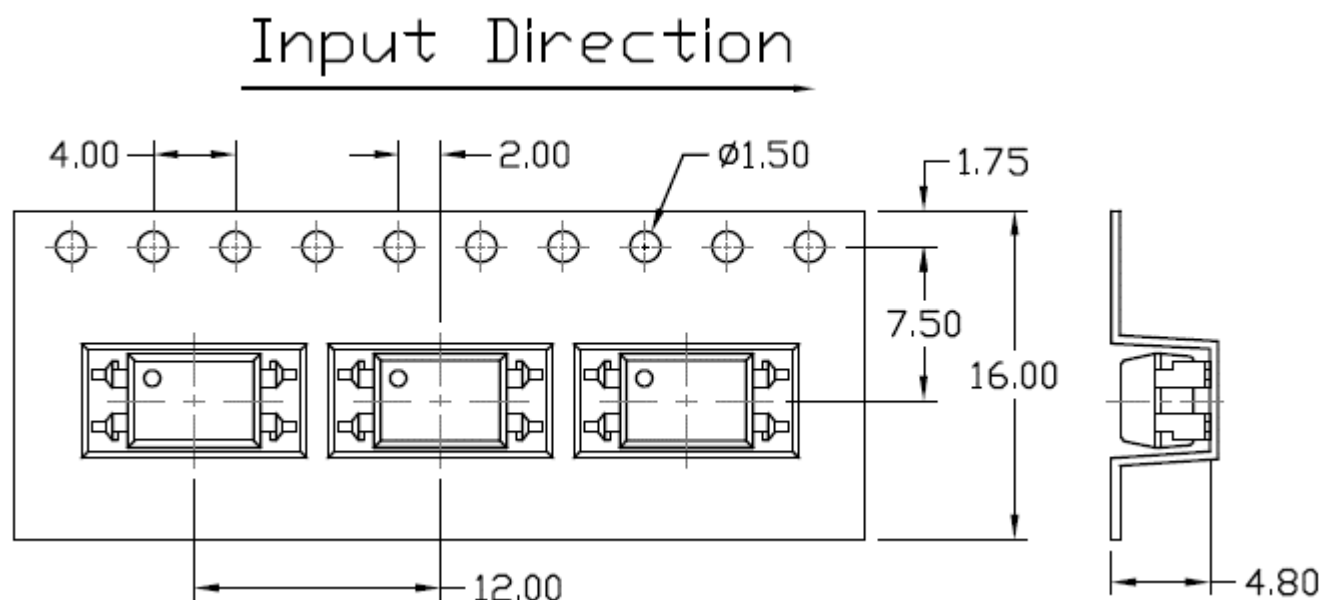
Option S(T2) & SL(T2)



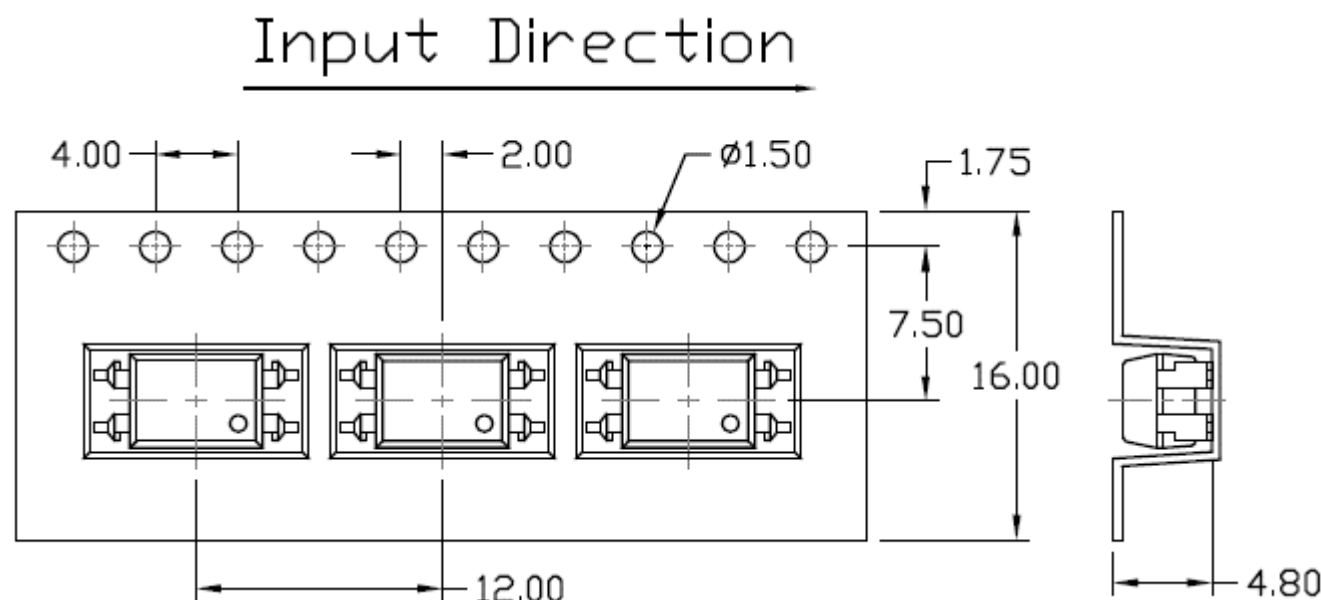


Low Dark Current 4-Pin Phototransistor Optocoupler

Option S(T3) & SL(T3)



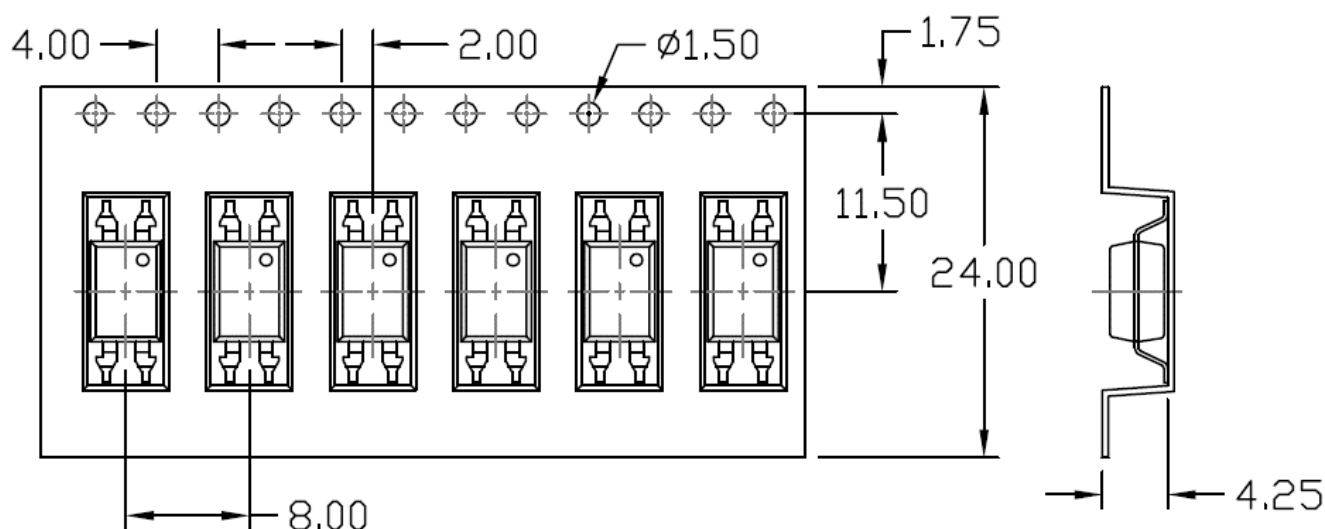
Option S(T4) & SL(T4)





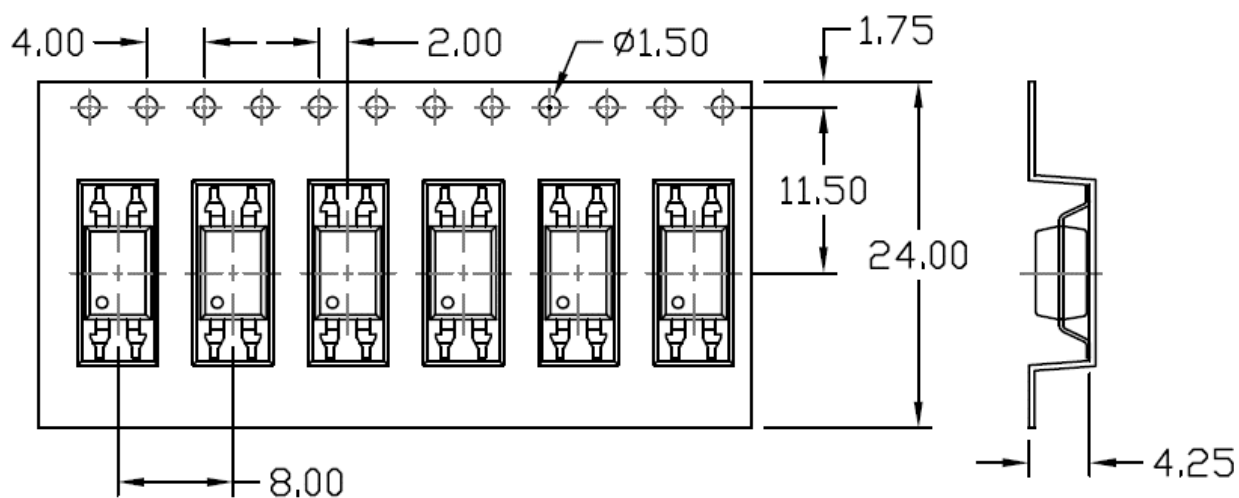
Option SLM(T1)

Input Direction



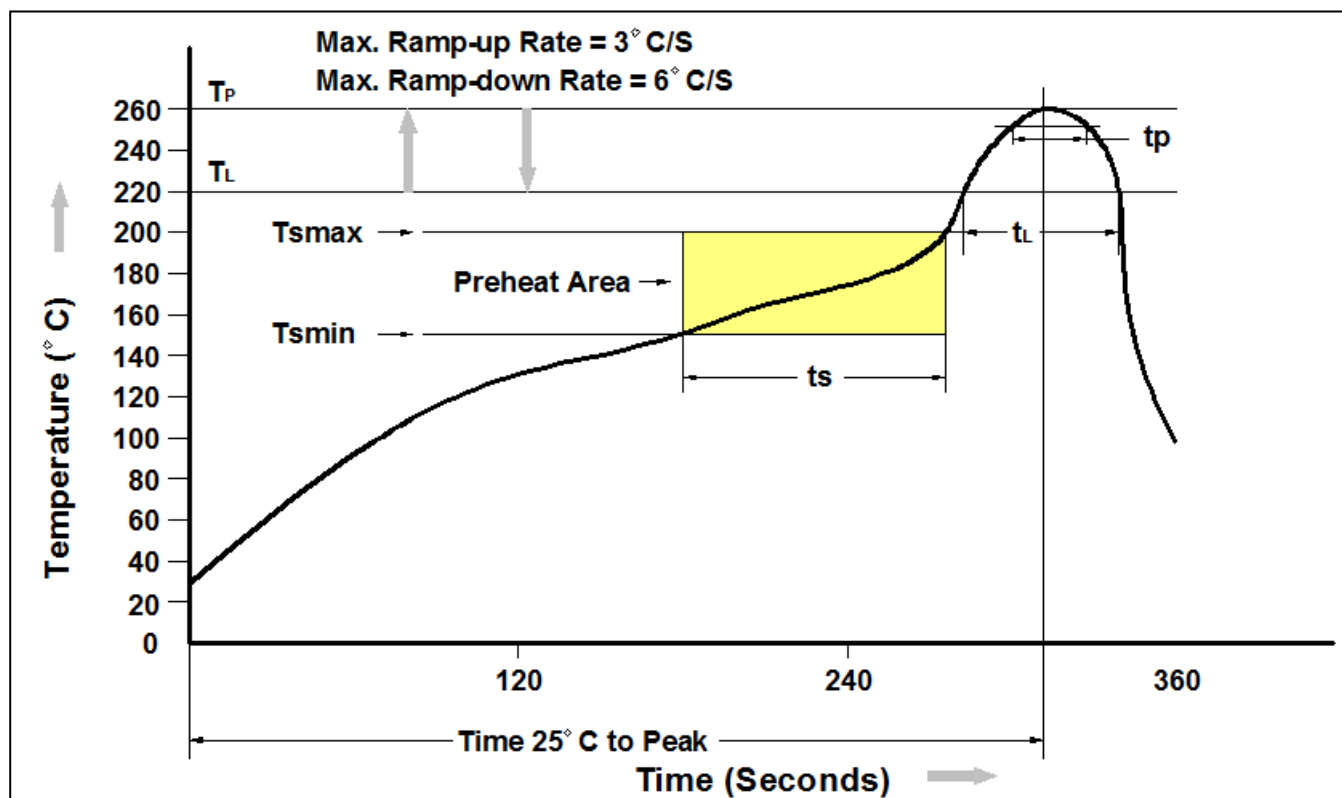
Option SLM(T2)

Input Direction





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.



CT2501 Series

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