CT3150

1.0A MOSFET/IGBT Gate Driver Optocoupler

Features

- Peak Output Current : IOP = ±1.0A (max)
- Threshold Input Current: IFLH = 5 mA (max)
- Common mode transient immunity : ±20kV/μs (min）
- Under voltage lock out (UVLO) protection with hysteresis
- Regulatory Approvals
  - UL - UL1577 (E364000)
  - VDE - EN60747-5-5(VDE0884-5) (Pending Approval)
  - CQC – GB4943.1, GB8898
  - IEC60065, IEC60950

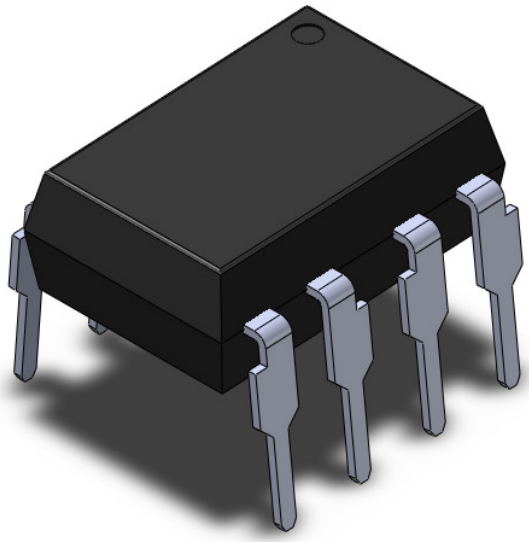
Description

The CT3150 consists of a GaAsP LED optically coupled to an integrated circuit with a power output stage. This optocoupler is ideally suited for driving power IGBTs and MOSFETs used in motor control inverter applications. The high operating voltage range of the output stage provides the drive voltages required by gate controlled devices.

Applications

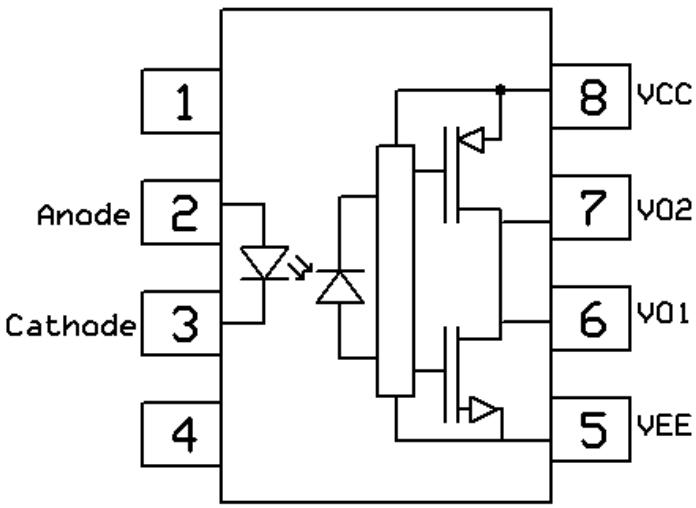
- Isolated IGBT/Power MOSFET gate drive
- Industrial Inverter
- AC brushless and DC motor drives
- Induction Heating

Package Outline



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

Schematic



Truth Table

LED	Vcc-V_{EE} Positive Going	Vcc-V_{EE} Negative Going	Output
Off	0 to 30 V	0 to 30V	Low
On	0 to 6.5V	0 to 6V	Low
On	6.5 to 8.3V	6 to 8V	Transition
On	8.3 to 30V	8 to 30V	High

Absolute Maximum Rating at 25°C

Symbol	*Parameters*	*Ratings*	*Units*	*Notes*
V_{ISO}	Isolation voltage	5000	V_{RMS}	1
T_{OPR}	Operating temperature	-40 ~ +100	^{0}C	
T_{STG}	Storage temperature	-55 ~ +125	^{0}C	
T_{SOL}	Soldering temperature	260	^{0}C	2
P_T	Total Power Dissipation	300	mW	
f_{OPR}	Operating Frequency	50	kHz	3
Emitter				
I_F	Forward current	25	mA	
I_{FP}	Peak forward current (50% duty, 1ms P.W)	1	A	
V_R	Reverse voltage	5	V	
P_I	Input Power dissipation	45	mW	
Detector				
P_O	Output Power dissipation	250	mW	
$V_{O(PEAK)}$	Peak Output Voltage	35	V	
I_{OPH}	Output High Peak Current	-1.0	A	4
I_{OPL}	Output Low Peak Current	1.0	A	4
V_{CC}	Supply voltage	35	V	

Notes

1. AC for 1 minute, RH = 40 ~ 60%.
2. For 10 second peak
3. Exponential Waveform, IO(PEAK) $\leq$ |1.0A|, Pulse Width $\leq$ 0.3us
4. Pulse Width = 10us, Duty = 1.0%

Recommended Operating Conditions

Characteristics	*Symbol*	*Min.*	*Typ.*	*Max.*	*Unit*
Input Current	$I_{F(ON)}$	7.5	-	10	mA
Input Voltage	$V_{F(OFF)}$	0	-	0.8	V
Supply Voltage	V_{CC}	10	-	30	V
Peak Output Current	I_{OPH}/I_{OPL}	-	-	±1.0	A
Operating Temperature	Topr	-40	-	100	°C

Electrical Characteristics

Typical values are measured at Vcc=30V, V_{EE}= Gnd, T_A = -40°C to 100°C (unless otherwise specified)

Emitter Characteristics

Symbol	*Parameters*	*Test Conditions*	*Min*	*Typ*	*Max*	*Units*	*Notes*
V_F	Forward Voltage	I_F = 5mA	-	1.4	1.7	V	
V_R	Reverse Voltage	I_R = 10μA	5.0	-	-	V	
$\Delta V_F/\Delta T_A$	Temperature coefficient of forward voltage	I_F =5mA	-	-1.7	-	mV/℃	

Detector Characteristics

Symbol	*Parameters*	*Test Conditions*	*Min*	*Typ*	*Max*	*Units*	*Notes*
I_{CCL}	Logic Low Supply Current	V_F = 0 to 0.8V, V_O= Open	-	1.95	3	mA	
I_{CCH}	Logic High Supply Current	I_F= 7mA to 10mA, V_O= Open	-	1.98	3		

Transfer Characteristics

Symbol	*Parameters*	*Test Conditions*	*Min*	*Typ*	*Max*	*Units*	*Notes*
V_{OH}	High Level Output Voltage	I_F= 5mA, I_O= -100mA	V_{CC}-4V	V_{CC}-0.3 V	-	V	
V_{OL}	Low Level Output Voltage	V_{CC}= 30V, I_O= 100mA	-	0.28	1.0		
I_{OPH}	High Level Output Current	V_{CC}= 30V, $V_{6\text{-}5}$= 4V, I_F= 5mA	-	-1	-0.5	A	
		V_{CC}= 30V, $V_{6\text{-}5}$= 15V, I_F= 5mA	-	-1.8	-1.0		
I_{OPL}	Low Level Output Current	V_{CC}= 30V, $V_{6\text{-}5}$= 2.5V, I_F= 0mA	0.5	0.75	-	A	
		V_{CC}= 30V, $V_{6\text{-}5}$= 10V, I_F= 0mA	1.0	1.5	-		
I_{FLH}	Input Threshold Current	V_O> 5V, V_{CC}= 30V	-	2.6	5	mA	
V_{FHL}	Input Threshold Voltage	V_O< 5V, V_{CC}= 30V	0.8	-	-	V	

Electrical Characteristics

Typical values are measured at Vcc=30V, V_{EE}= Gnd, T_A = -40^{0}C to 100^{0}C (unless otherwise specified)

Switching Characteristics

Symbol	*Parameters*	*Test Conditions*		*Min*	*Typ*	*Max*	*Units*	*Notes*
T_{PHL}	High to Low Propagation Delay	I_F= 7 to 16mA, C_g= 3nF, R_g= 47Ω		-	110	200	ns	
T_{PLH}	Low to High Propagation Delay			-	120	200	ns	
P_{WD}	Pulse Width Distortion			-	-	45	ns	
t_{PSK}	Propagation Delay Skew			-	-	38	ns	
t_r	Rise Time			-	30	100	ns	
t_f	Fall Time			-	15	60	ns	
$\|CM_H\|$	Common Mode Transient High	V_{CC}= 30V, T_A= 25^{0}C, V_{CM}= 1kV	I_F= 7 to 16mA $V_{O(min)}$=26V	-20	-	-	kV/µs	
$\|CM_L\|$	Common Mode Transient Low		I_F= 0mA $V_{O(max)}$=1V	20	-	-	kV/µs	

Typical Characteristic Curves

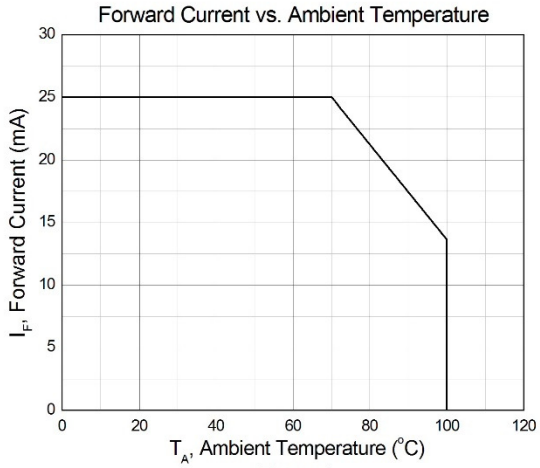


Figure 1

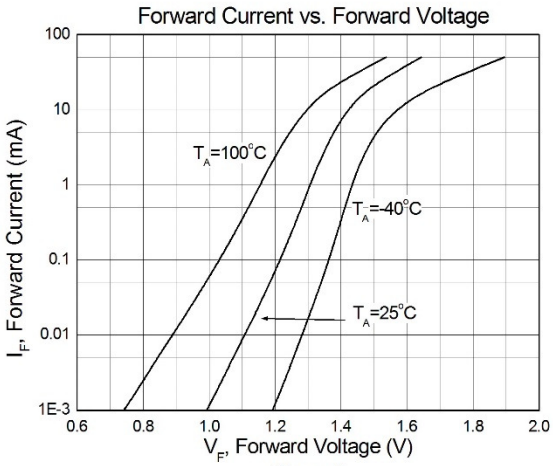


Figure 2

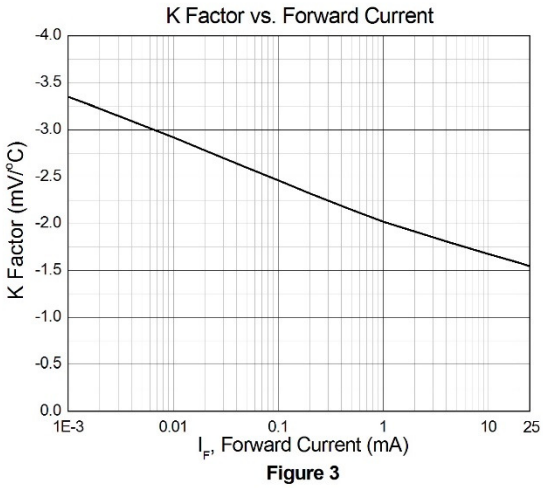


Figure 3

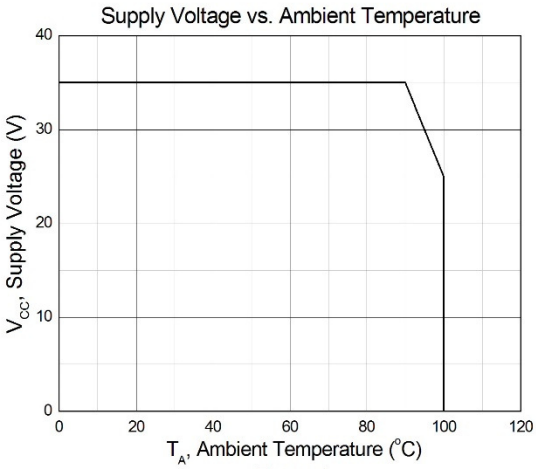


Figure 4

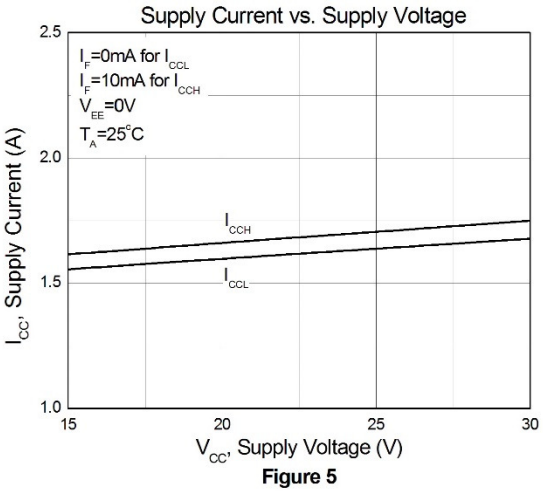


Figure 5

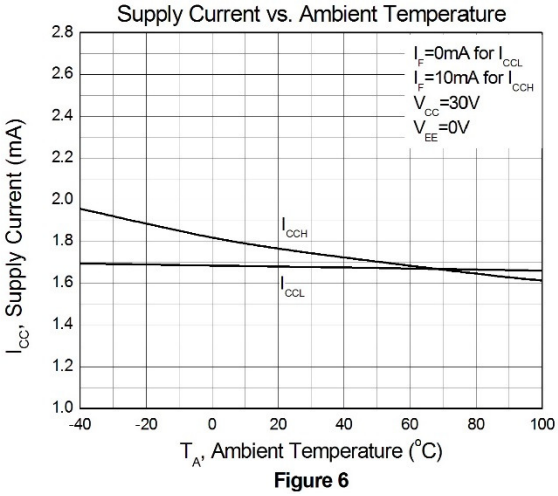


Figure 6

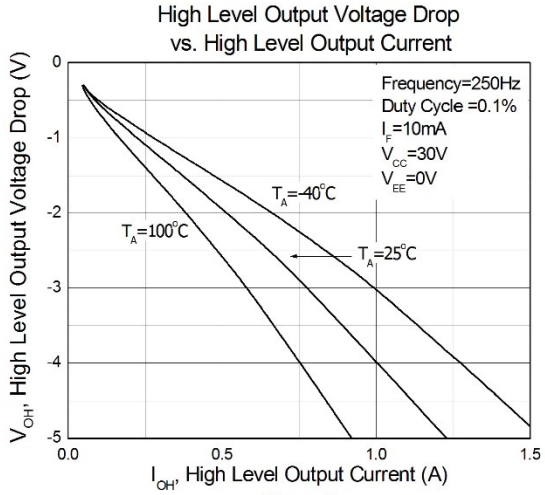


Figure 7

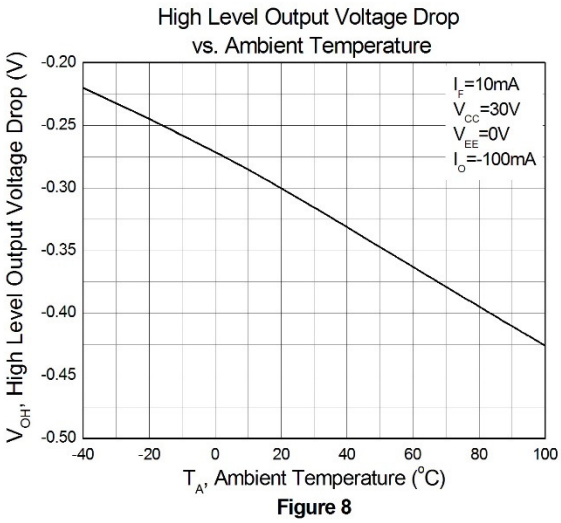


Figure 8

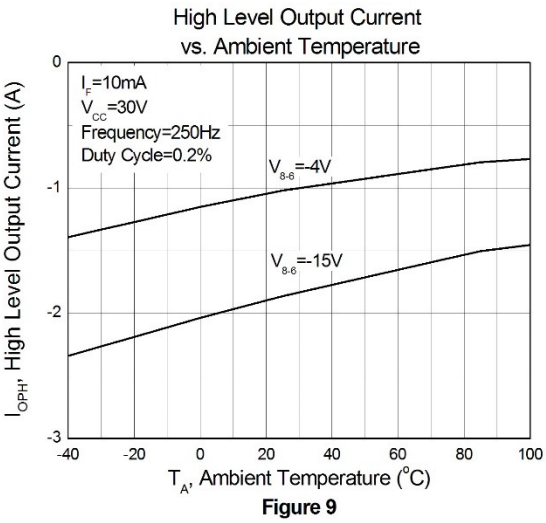


Figure 9

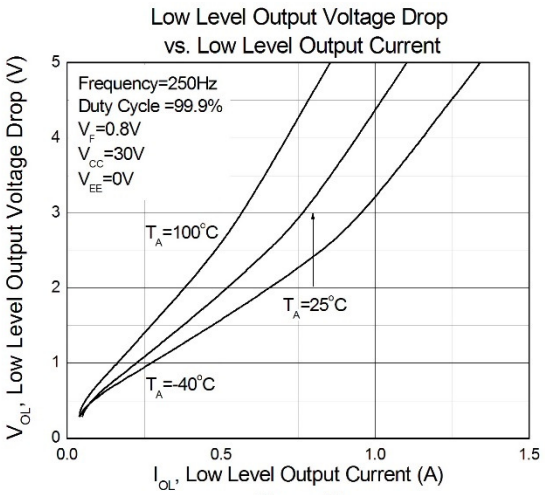


Figure 10

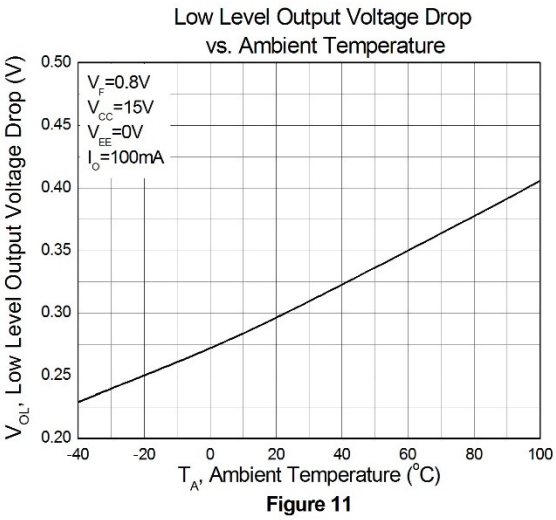


Figure 11

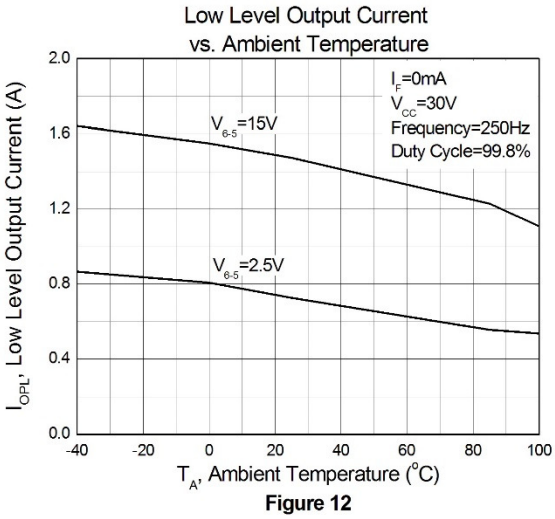


Figure 12

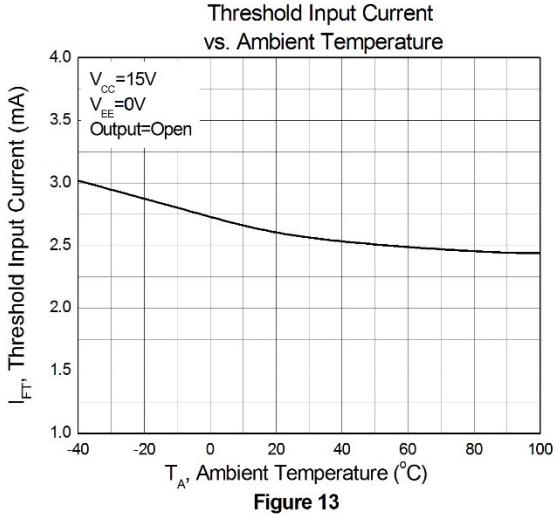


Figure 13

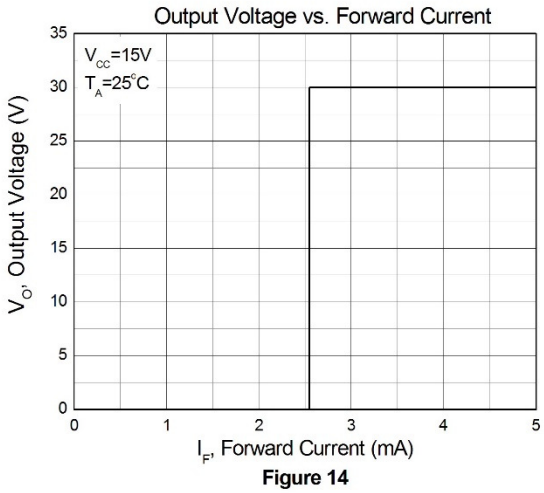


Figure 14

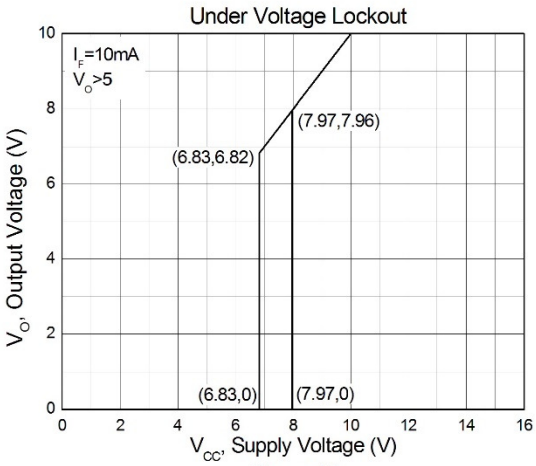


Figure 15

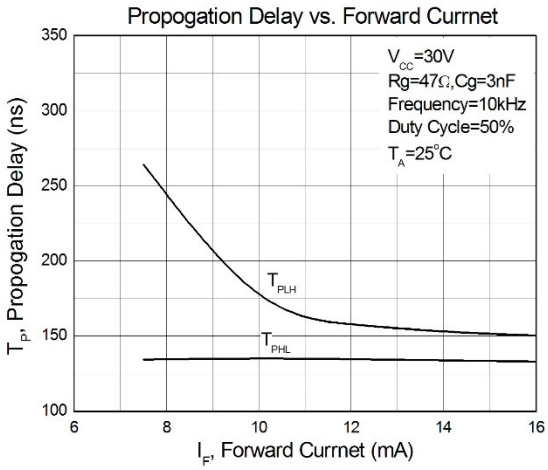


Figure 16

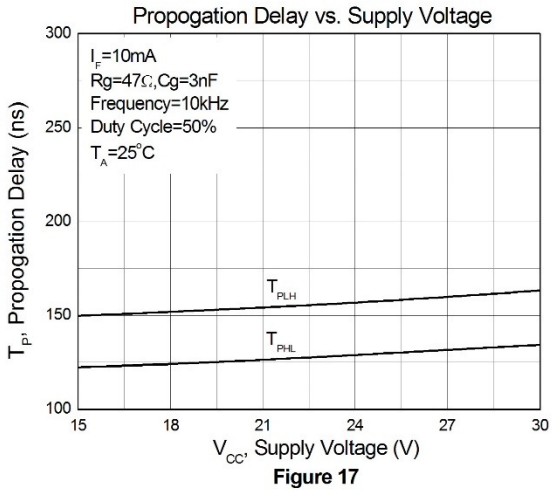


Figure 17

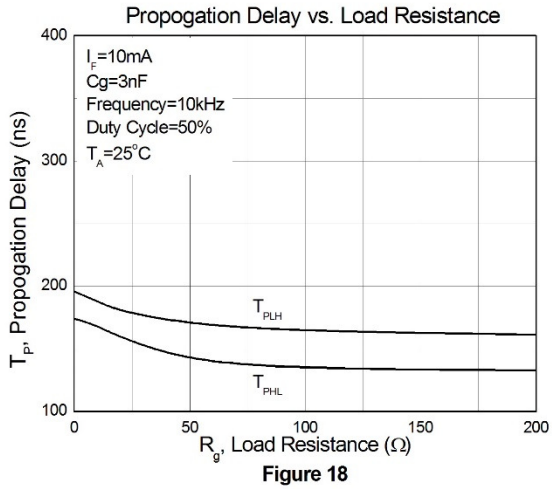


Figure 18

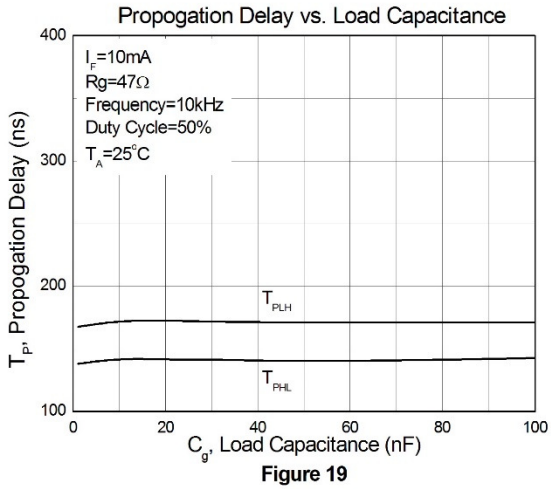


Figure 19

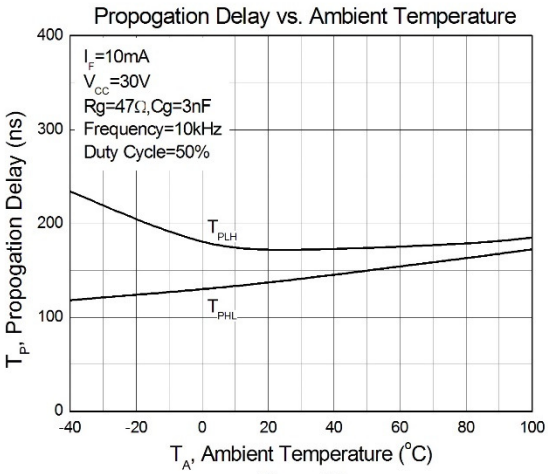
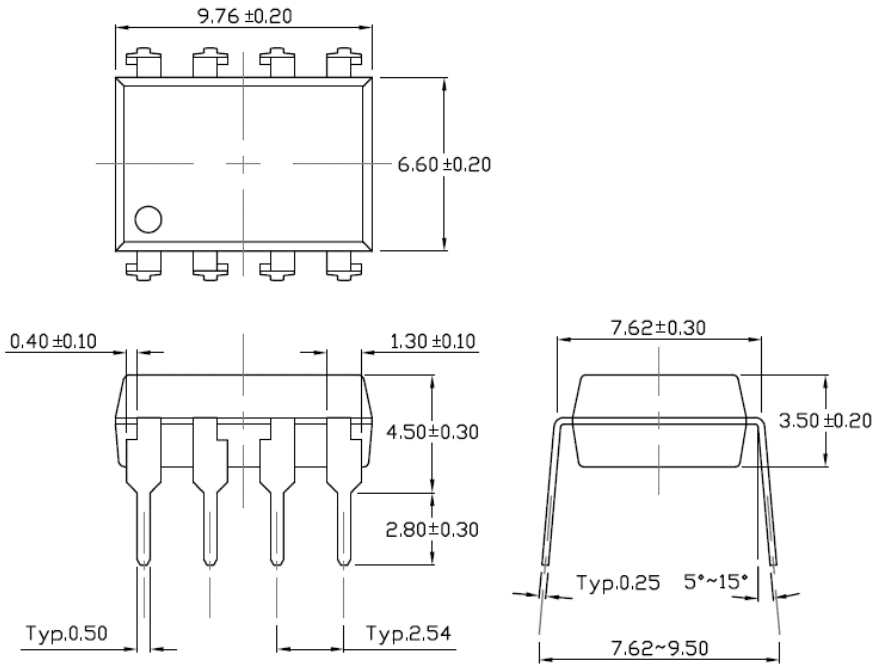


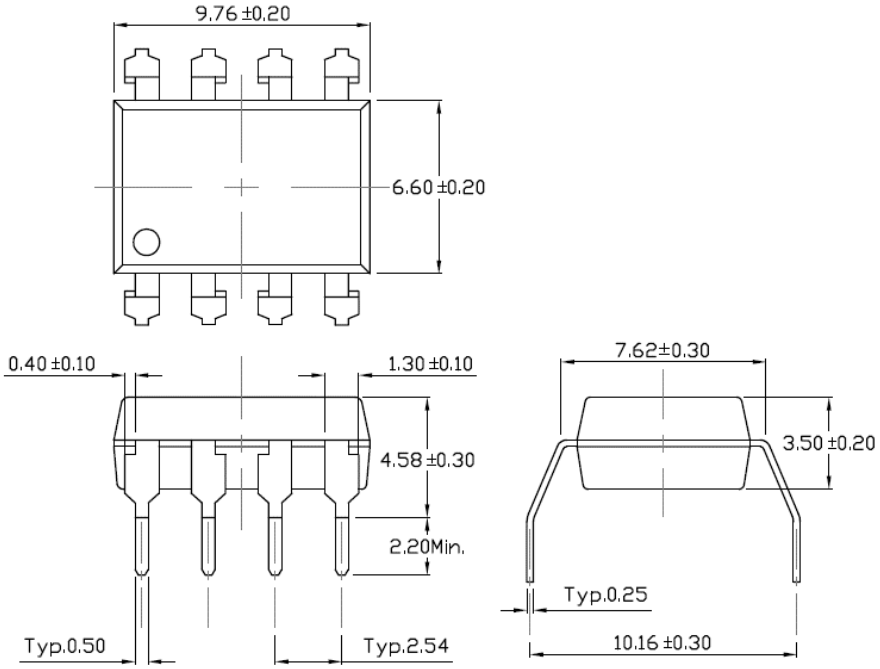
Figure 20

Package Dimension *Dimensions in mm unless otherwise stated*

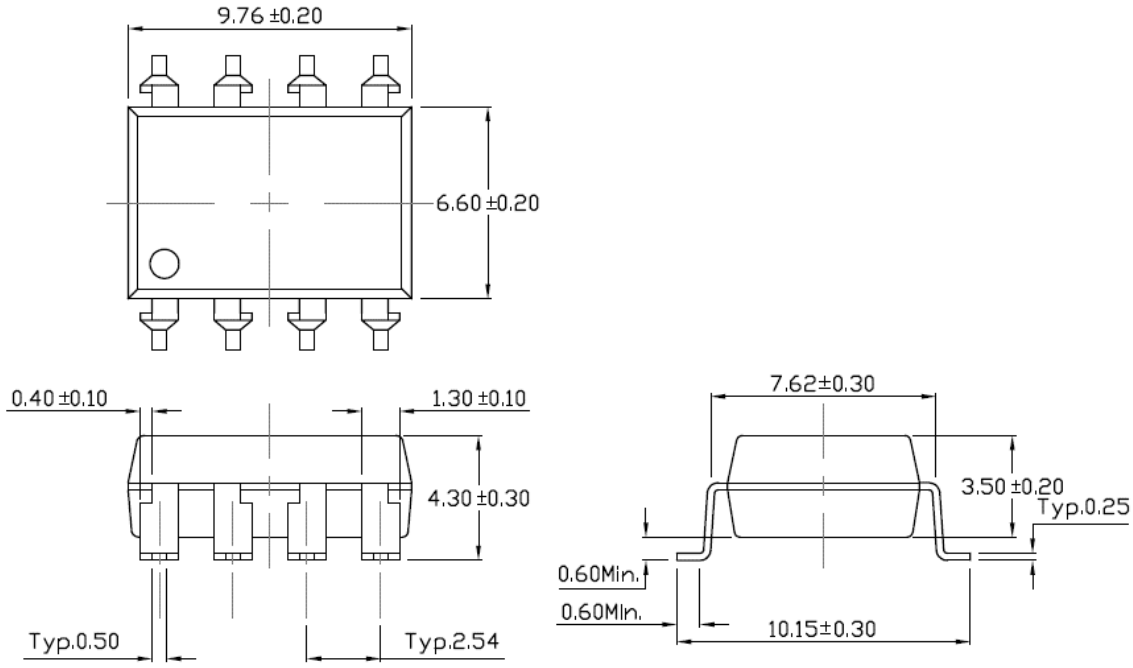
Standard DIP – Through Hole



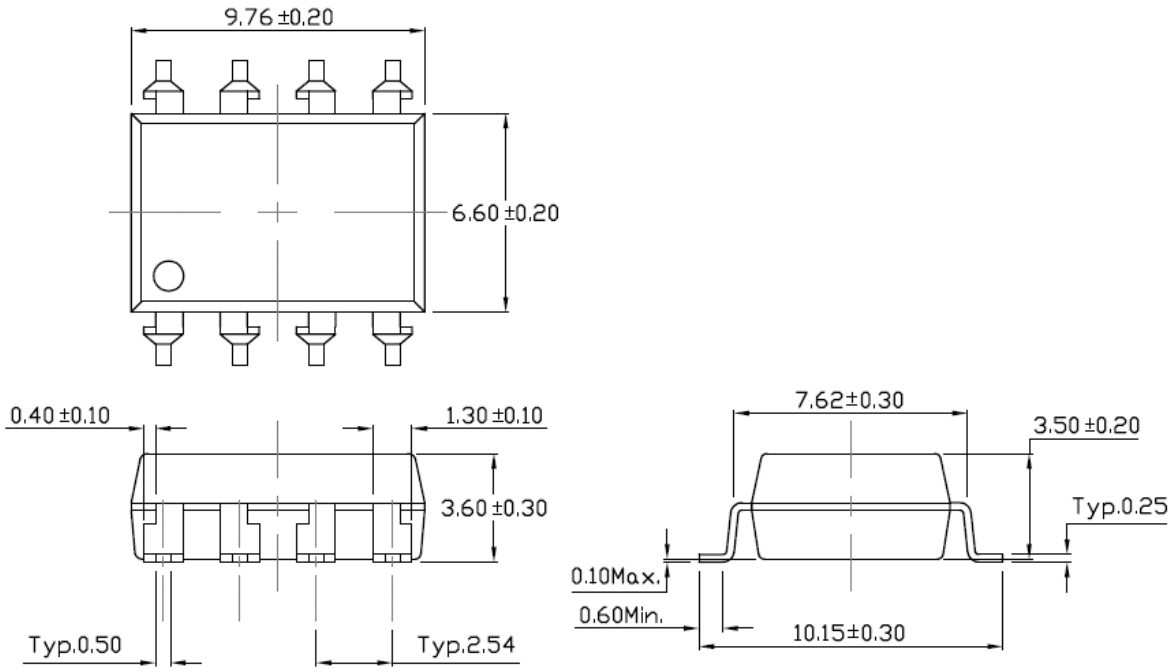
Gullwing (400mil) Lead Forming – Through Hole (M Type)



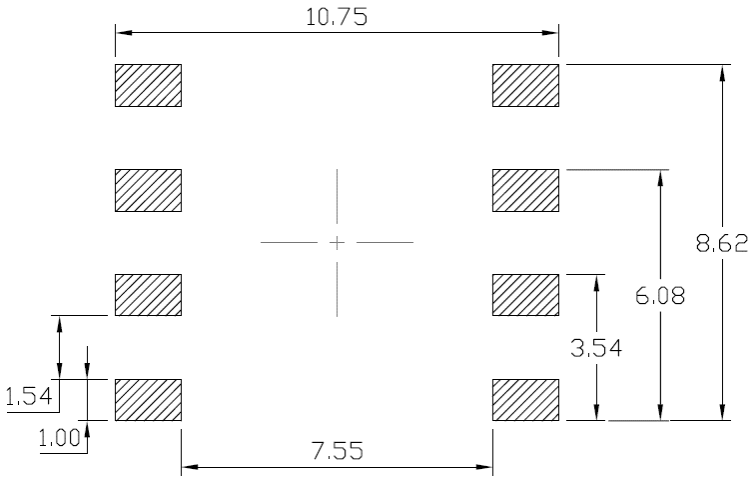
Surface Mount Lead Forming (S Type)



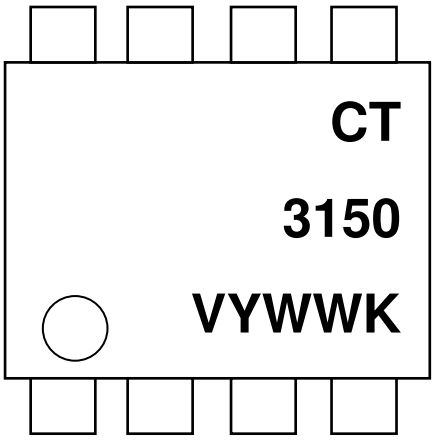
Surface Mount (Low Profile) Lead Forming (SL Type)



Recommended Solder Mask *Dimensions in mm unless otherwise stated*



Device Marking



CT : Denotes “CT Micro”
3150 : Product Number
V : VDE Option
Y : Fiscal Year
WW : Work Week
K : Production Code

Ordering Information

CT3150(V)(Y)(Z)

V = VDE Option (V or None)

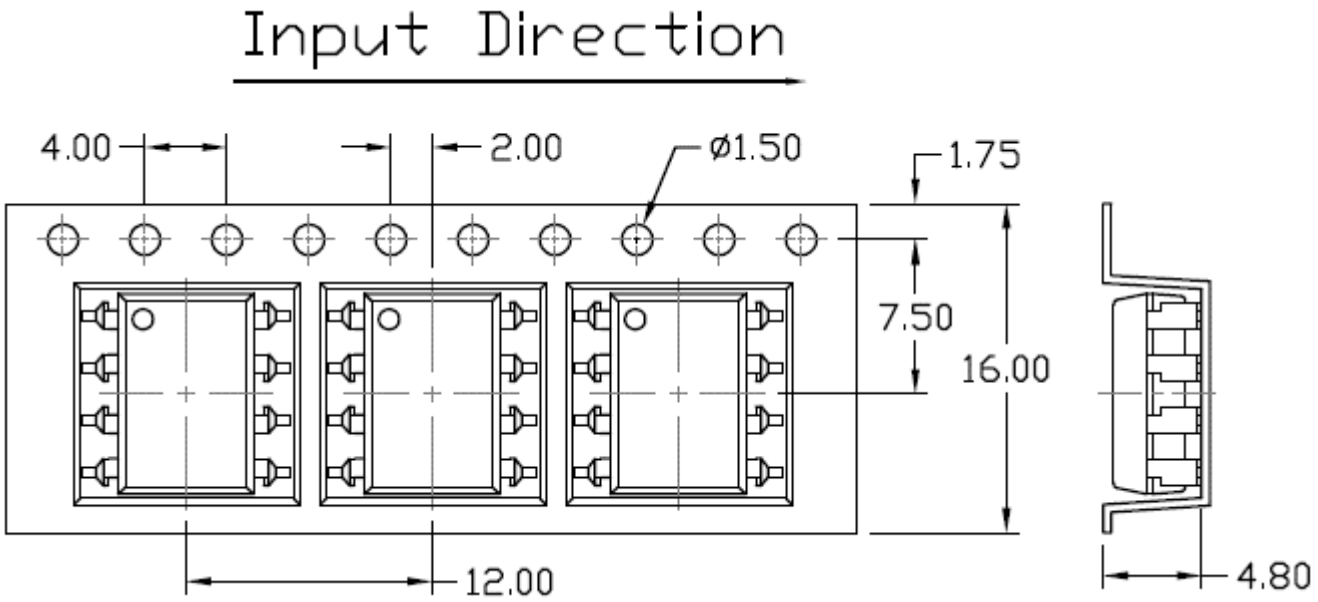
Y = Lead form option (S, SL, M or none)

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

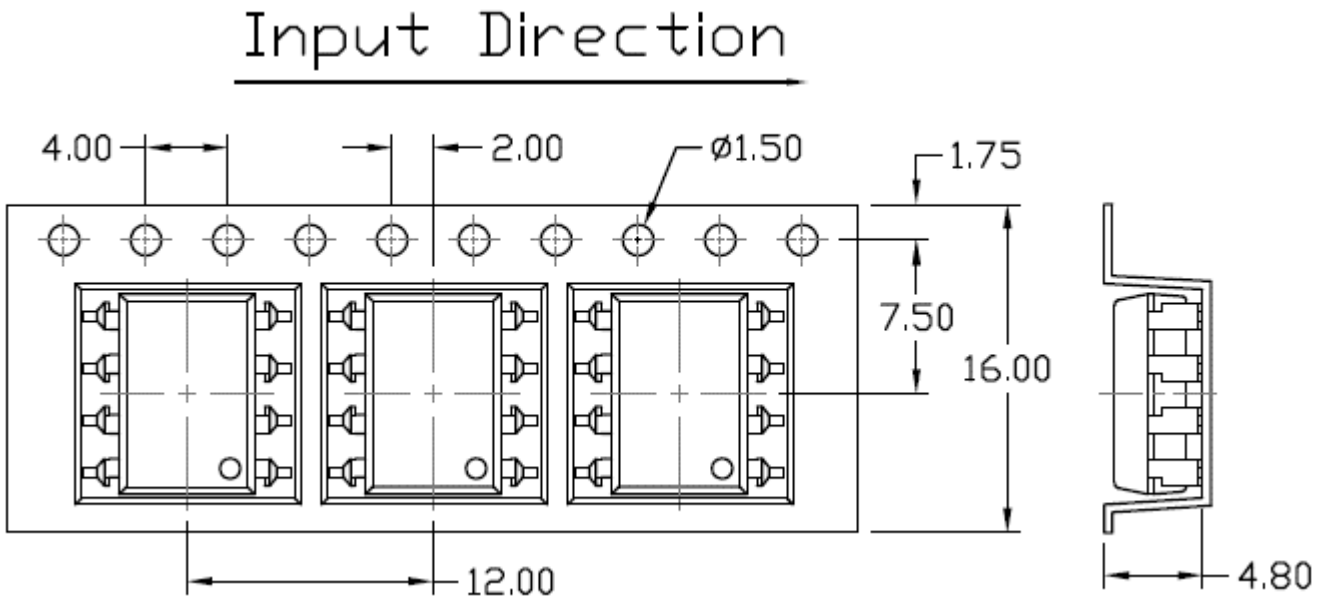
Option	***Description***	***Quantity***
None	Standard 8 Pin Dip	40 Units/Tube
M	Gullwing (400mil) Lead Forming	40 Units/Tube
S(T1)	Surface Mount Lead Forming – With Option 1 Taping	1000 Units/Reel
S(T2)	Surface Mount Lead Forming – With Option 2 Taping	1000 Units/Reel
SL(T1)	Surface Mount (Low Profile) Lead Forming– With Option 1 Taping	1000 Units/Reel
SL(T2)	Surface Mount (Low Profile) Lead Forming – With Option 2 Taping	1000 Units/Reel

Carrier Tape Specifications *Dimensions in mm unless otherwise stated*

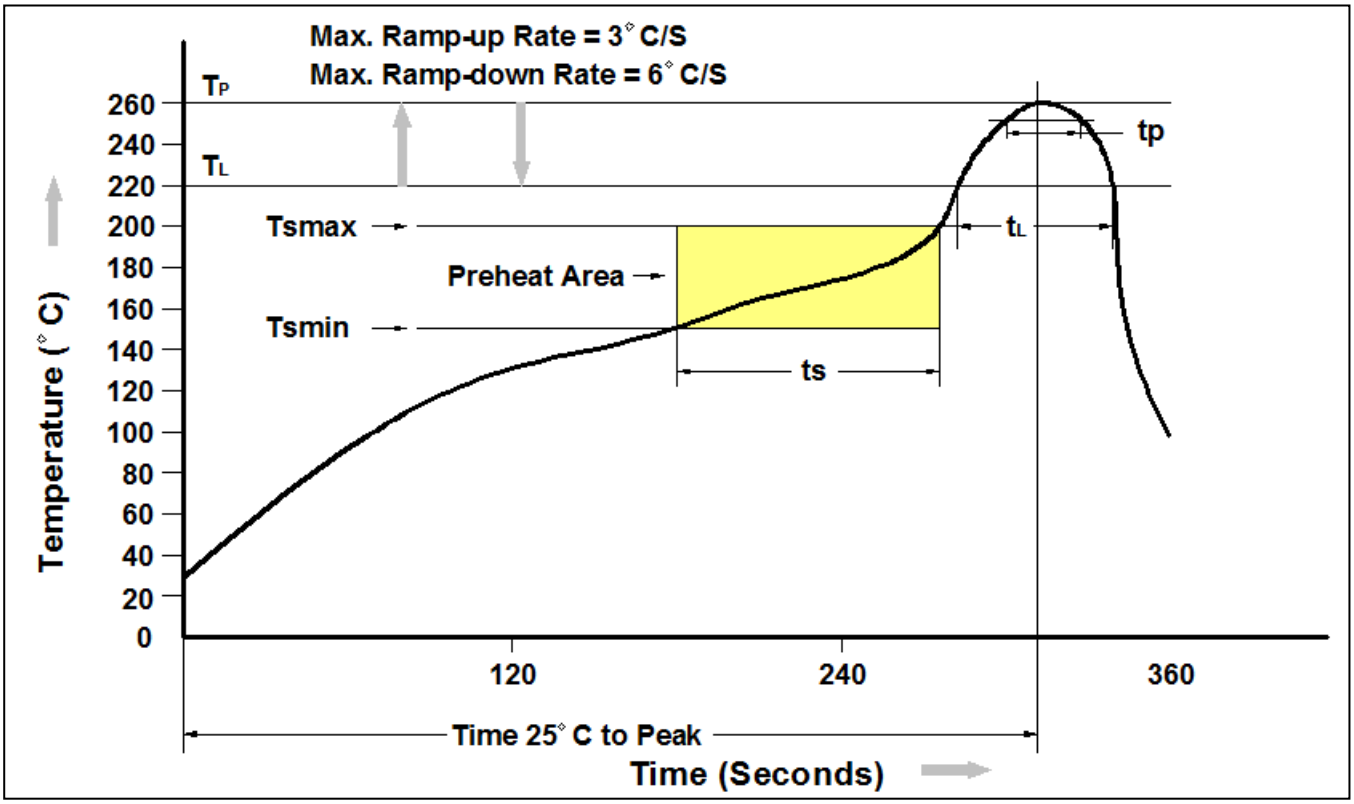
Option S(T1) & SL(T1)



Option S(T2) & SL(T2)



Reflow Profile



Profile Feature	Pb-Free Assembly Profile
Temperature Min. (Tsmin)	150℃
Temperature Max. (Tsmax)	200℃
Time (ts) from (Tsmin to Tsmax)	60-120 seconds
Ramp-up Rate (t_L to t_P)	3℃/second max.
Liquidous Temperature (T_L)	217℃
Time (t_L) Maintained Above (T_L)	60 – 150 seconds
Peak Body Package Temperature	260℃ +0℃ / -5℃
Time (t_P) within 5℃ of 260℃	30 seconds
Ramp-down Rate (T_P to T_L)	6℃/second max
Time 25℃ 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.

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.*