



2.5A MOSFET/IGBT Gate Driver DMC-Isolator[®] Optocoupler

Features

- Peak Output Current : IOP = ±2.5A (max)
- Threshold Input Current: IFLH = 5 mA (max)
- Common mode transient immunity : ±25kV/μs (min)
- Under voltage lock out (UVLO) protection with hysteresis
- Pb free and RoHS compliant.
- Regulatory Approvals
 - UL - UL1577 (E364000)
 - VDE - EN60747-5-5(VDE0884-5)
 - CQC – GB4943.1, GB8898 (14001104999)
 - IEC62368 (FI/41119)

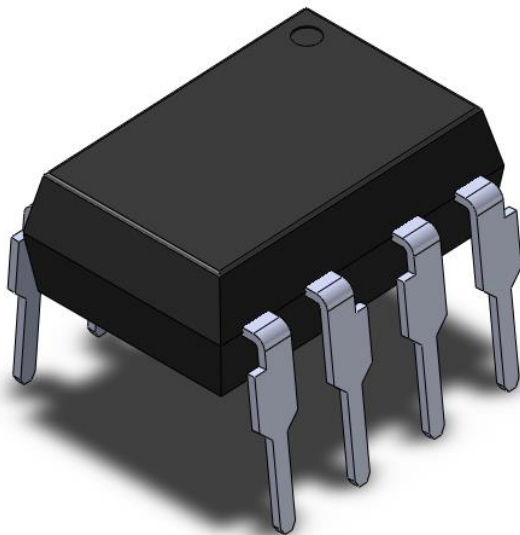
Description

The CT350 consists of a 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

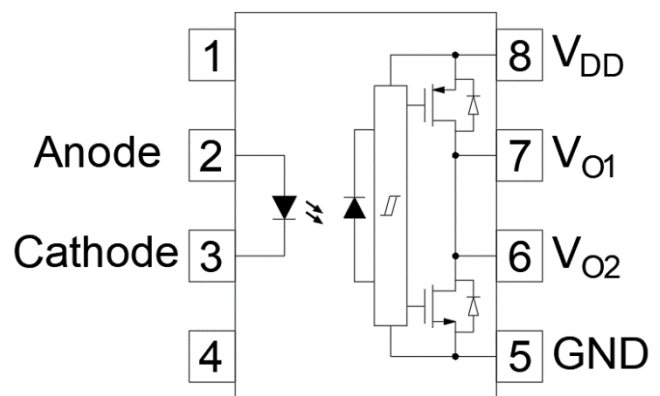
- Isolated IGBT/Power MOSFET gate drive
- Industrial Inverter
- AC brushless and DC motor drives
- Induction Heating

Package Outline



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

Schematic





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Truth Table

LED	V _{CC} -V _{EE} Positive Going	V _{CC} -V _{EE} Negative Going	Output
Off	0 to 30 V	0 to 30V	Low
On	0 to 11.0V	0 to 9.5V	Low
On	11.0 to 13.5V	9.5 to 12V	Transition
On	13.5 to 30V	12 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	°C	
T _{STG}	Storage temperature	-55 ~ +125	°C	
T _{SOL}	Soldering temperature	260	°C	2
P _T	Total Power Dissipation	300	mW	
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	
Detector				
P _D	Power dissipation	250	mW	
V _{O(PEAK)}	Peak Output Voltage	0 to 30	V	3
I _{OPH}	Output High Peak Current	2.5	A	4
I _{OPL}	Output Low Peak Current	2.5		
V _{CC}	Supply voltage	0 to 30	V	

Notes

1. AC for 1 minute, RH = 40 ~ 60%.
2. For 10 second peak
3. The V_{O(PEAK)} voltage CAN NOT BE high than V_{CC}.
4. The I_o maximum pulse width = 10 μs, maximum duty cycle = 0.2%.



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Electrical Characteristics

Over recommended operating conditions $T_A = -40$ to 100 °C. Typical values are measured at $V_{CC}=30V$, $V_{EE}= GND$, $T_A = 25^\circ C$ (unless otherwise stated)

Emitter Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
V_F	Forward voltage	$I_F = 10mA$	-	1.45	1.8	V	
V_R	Reverse Voltage	$I_R = 10\mu A$	5.0	-	-	V	
$\Delta V_F/\Delta T_A$	Temperature coefficient of forward voltage	$I_F = 10mA$	-	-1.8	-	mV/°C	

Detector Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
I_{CCL}	Logic Low Supply Current	$V_F = 0$ to $0.8V$, $V_O = \text{Open}$	-	1.5	5	mA	
I_{CCH}	Logic High Supply Current	$I_F = 7mA$ to $10mA$, $V_O = \text{Open}$	-	1.5	5		

Transfer Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
V_{OH}	High Level Output Voltage	$I_F = 10mA$, $I_O = -2.5A$	$V_{CC} - 6$	-	-	V	
		$I_F = 10mA$, $I_O = -100mA$	$V_{CC} - 4$	-	-		
V_{OL}	Low Level Output Voltage	$I_F = 0mA$, $I_O = 2.5A$	-	-	$V_{EE} + 6$	V	
		$I_F = 0mA$, $I_O = 100mA$	-	-	$V_{EE} + 4$		
I_{OPH}	High Level Output Current	$V_O = V_{CC} - 3V$	-	-	-1	A	1
		$V_O = V_{CC} - 6V$	-	-	-2		1
I_{OPL}	Low Level Output Current	$V_O = V_{EE} + 3V$	1	-	-	A	1
		$V_O = V_{EE} + 6V$	2	-	-		1
I_{FLH}	Input Threshold Current	$I_O = 0mA$, $V_O > 5V$	-	1.4	5.0	mA	
V_{FHL}	Input Threshold Voltage	$I_O = 0mA$, $V_O < 5V$	0.8	-	-	V	
V_{UVLO+}	Under Voltage Lockout Threshold	$I_O = 10mA$, $V_O > 5V$	11	-	13.5	V	
V_{UVLO-}		$I_O = 10mA$, $V_O < 5V$	9.5	-	12.0		

Notes

- The I_O maximum pulse width = 10 μs , maximum duty cycle = 0.2%.



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Switching Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
T_{PHL}	High to Low Propagation Delay	$I_F = 7$ to $16mA$, $C_L = 10nF$, $R_L = 10\Omega$, $f = 10kHz$, Duty = 50%, $T_A = 25^\circ C$	100	180	500	ns	
T_{PLH}	Low to High Propagation Delay		100	140	500	ns	
P_{WD}	Pulse Width Distortion		40	300	ns		
t_{PSK}	Propagation Delay Skew		40	ns			
t_r	Rise Time		20	ns			
t_f	Fall Time		20	ns			
$t_{UVLO(ON)}$	UVLO Turn On Delay	$I_F = 10mA$, $V_O > 5V$		3.5		μs	
$t_{UVLO(OFF)}$	UVLO Turn Off Delay	$I_F = 10mA$, $V_O < 5V$		3		μs	
$ CM_H $	Common Mode Transient High	$V_{CC} = 30V$, $T_A = 25^\circ C$, $I_F = 7$ to $16mA$	25			$kV/\mu s$	
$ CM_L $	Common Mode Transient Low	$V_{CM} = 1.5kV$, $I_F = 0mA$	25			$kV/\mu s$	



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Typical Characteristic Curves

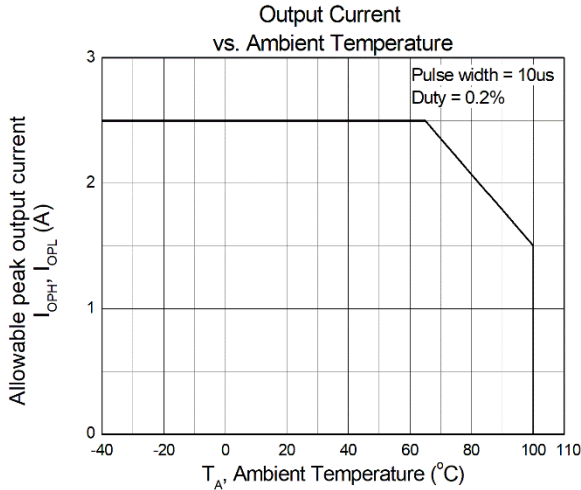


Figure 1

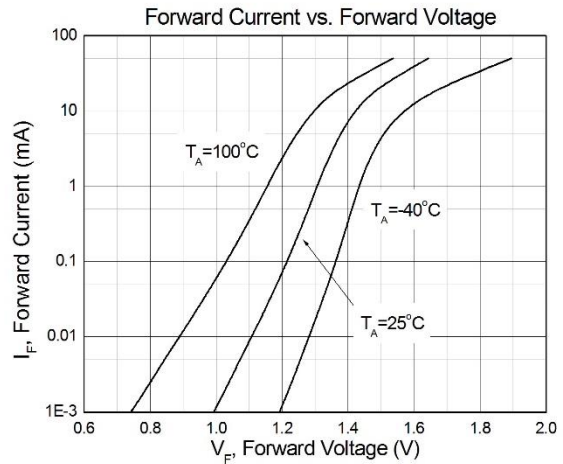


Figure 2

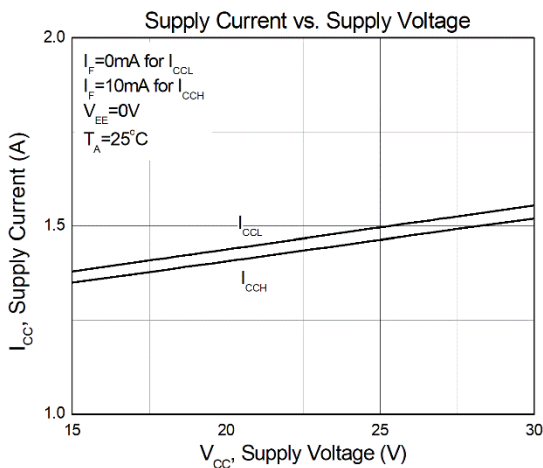


Figure 3

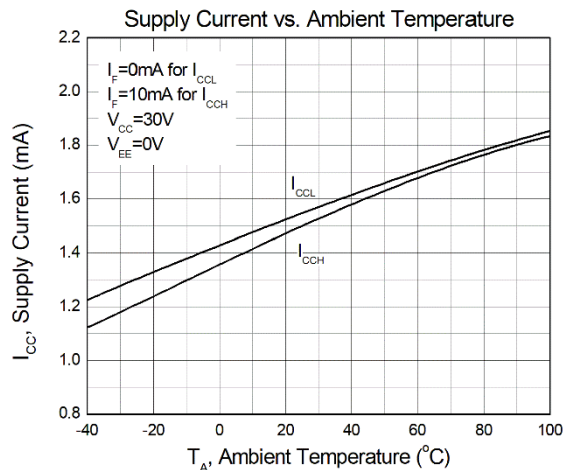


Figure 4

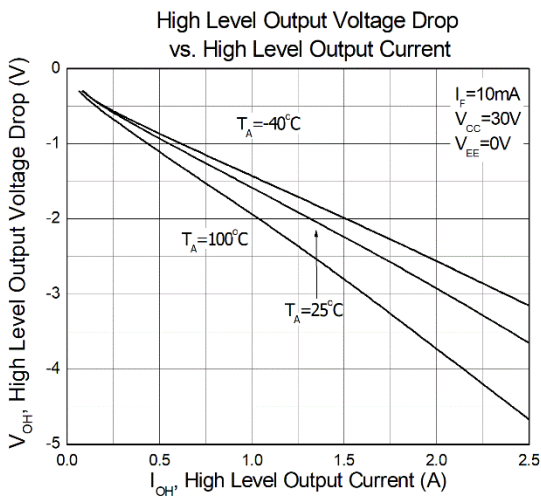


Figure 5

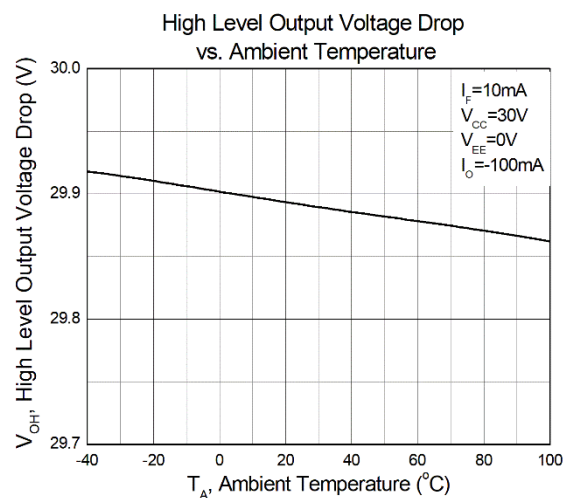


Figure 6



2.5A MOSFET/IGBT Gate Driver DMC-Isolator[®] Optocoupler

High Level Output Current vs. Ambient Temperature

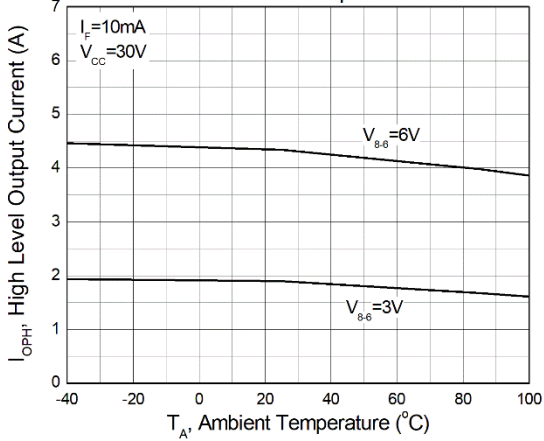


Figure 7

Low Level Output Voltage Drop vs. Low Level Output Current

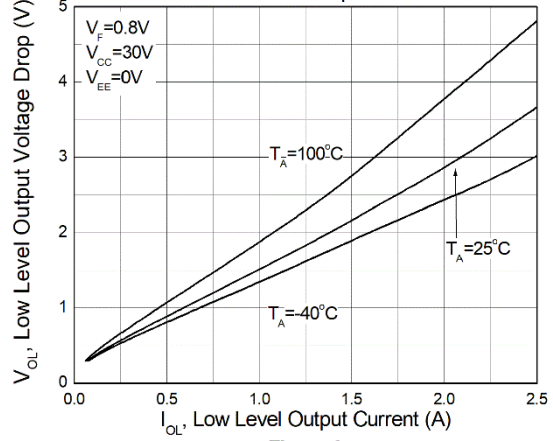


Figure 8

Low Level Output Voltage Drop vs. Ambient Temperature

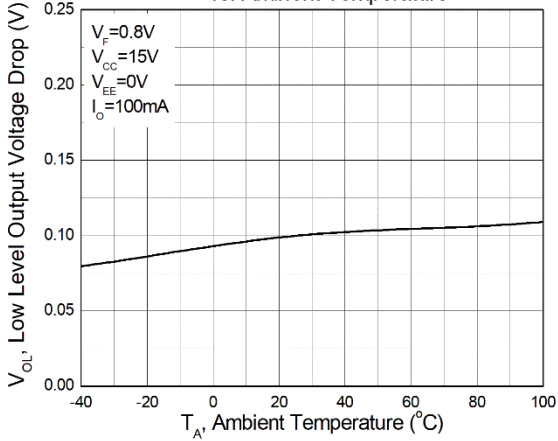


Figure 9

Low Level Output Current vs. Ambient Temperature

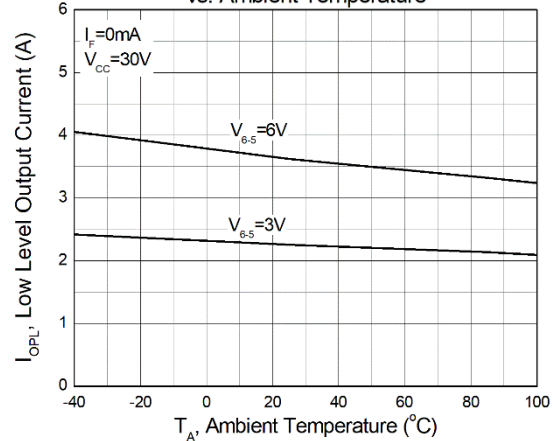


Figure 10

Threshold Input Current vs. Ambient Temperature

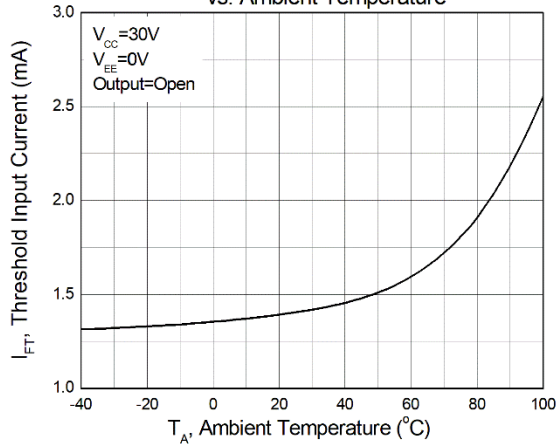


Figure 11

Output Voltage vs. Forward Current

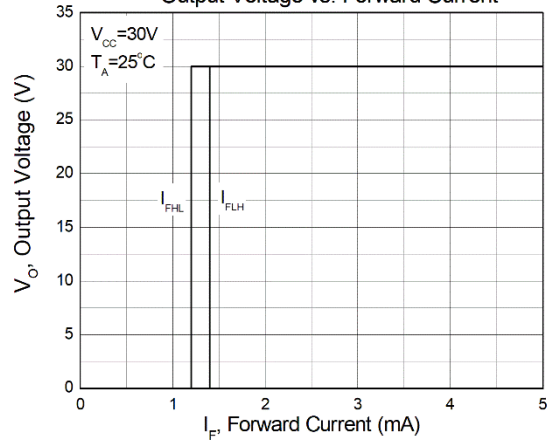


Figure 12



2.5A MOSFET/IGBT Gate Driver DMC-Isolator[®] Optocoupler

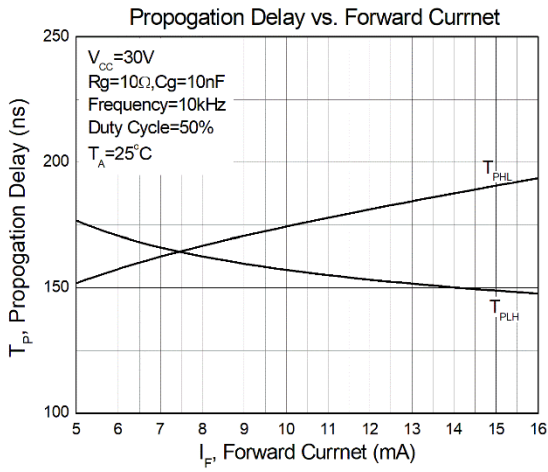


Figure 13

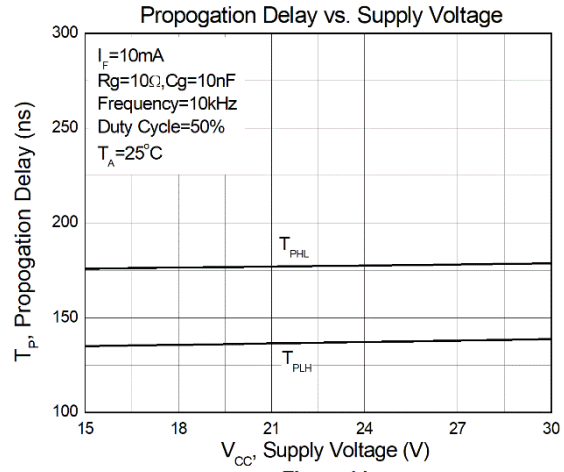


Figure 14

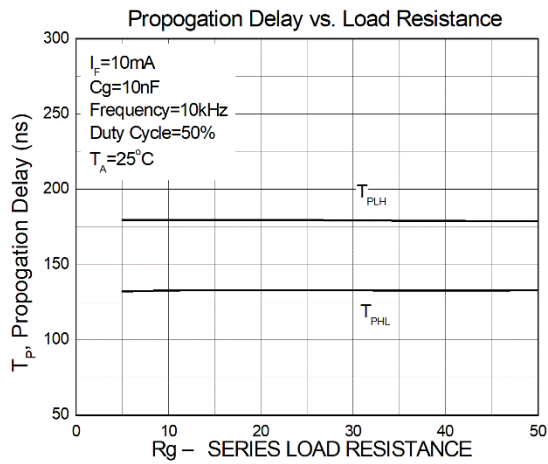


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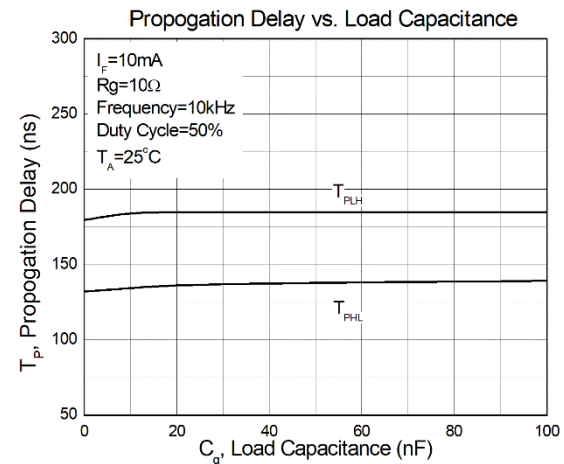


Figure 16

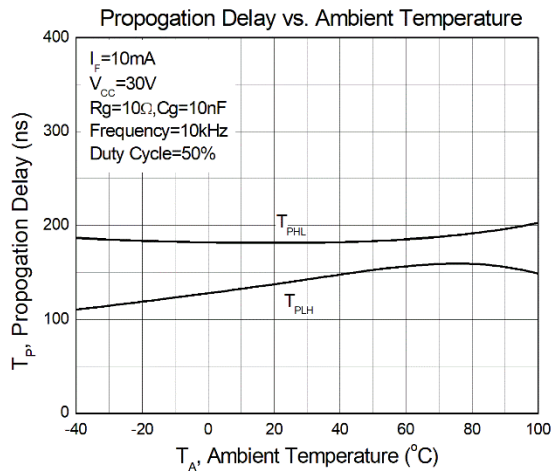


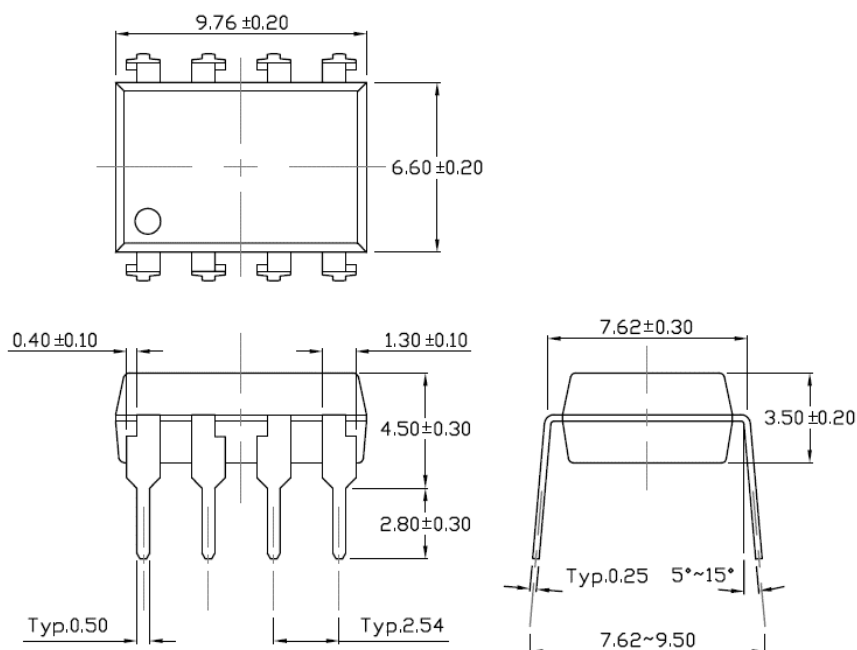
Figure 17



2.5A MOSFET/IGBT Gate Driver DMC-Isolator® Optocoupler

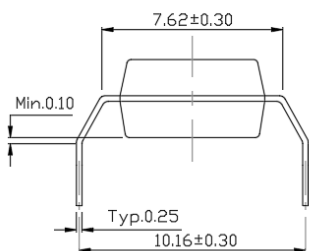
Package Dimension *Dimensions in mm unless otherwise stated*

Standard DIP – Through Hole

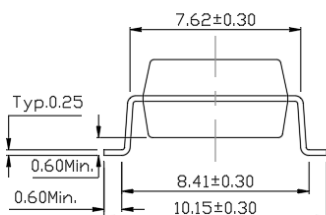


Forming Option *Dimensions in mm unless otherwise stated*

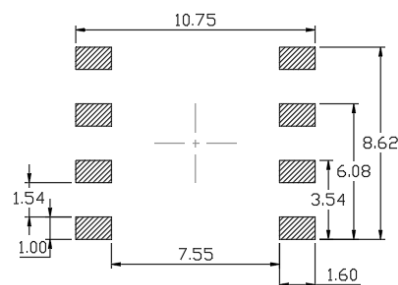
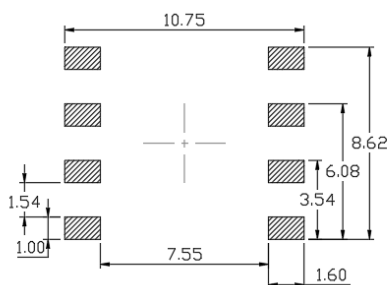
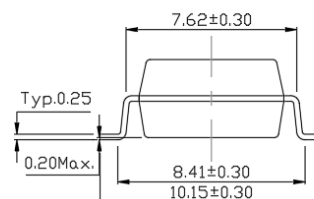
M Type



S Type



SL Type





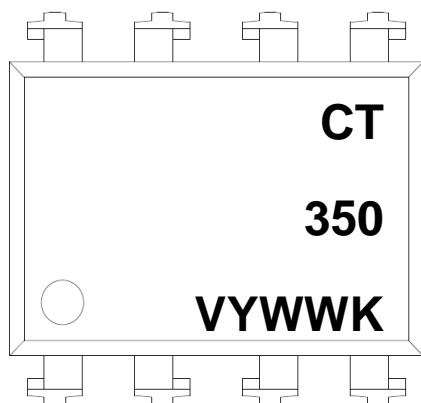
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CT350

2.5A MOSFET/IGBT Gate Driver

DMC-Isolator[®] Optocoupler

Marking Information



Note:

- CT : Denotes “CT Micro”
- 350 : Part Number
- V : VDE Safety Mark Option (Blank or V)
- Y : One Digit Year Code
- WW : Two Digit Work Week
- K : Manufacturing Code



**2.5A MOSFET/IGBT Gate Driver
DMC-Isolator[®] Optocoupler**

Ordering Information

CT350(V)(Y)(Z)

- CT = Denotes “CT Micro”
- 350 = Part Number
- V = VDE Safety Mark Option (Blank or V)
- Y = Lead Form Option (Blank, S, SL, M)
- Z = Tape and Reel Option (Blank, T1, T2)

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



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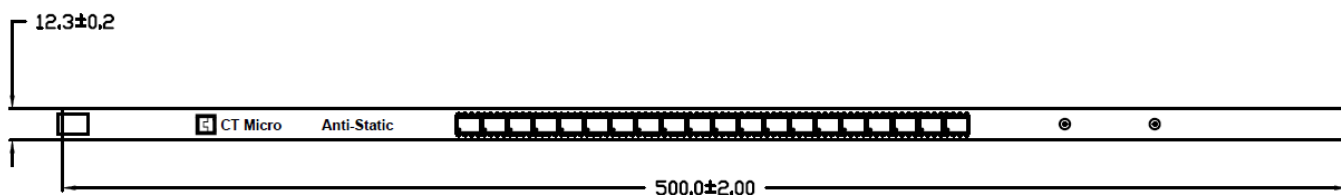
CT350

2.5A MOSFET/IGBT Gate Driver

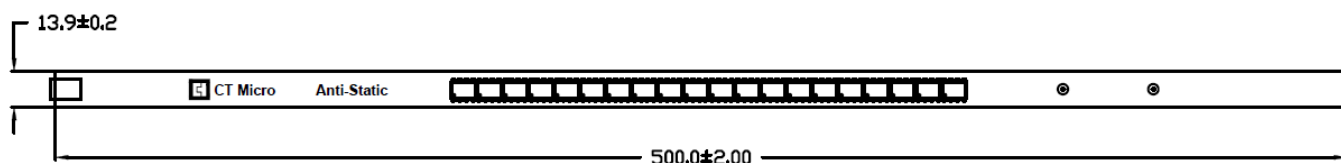
DMC-Isolator[®] Optocoupler

Carrier Specifications *Dimensions in mm unless otherwise stated*

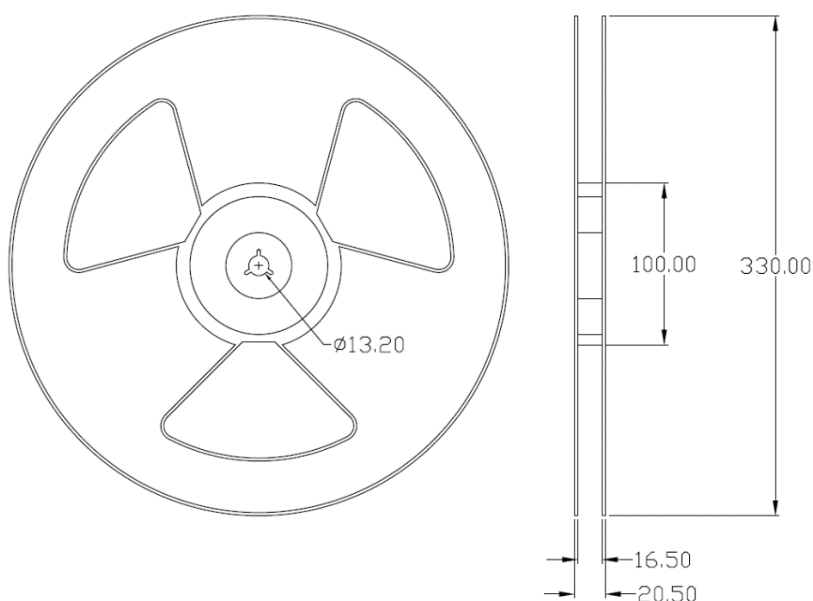
Tube Option Standard DIP



Tube Option M Type



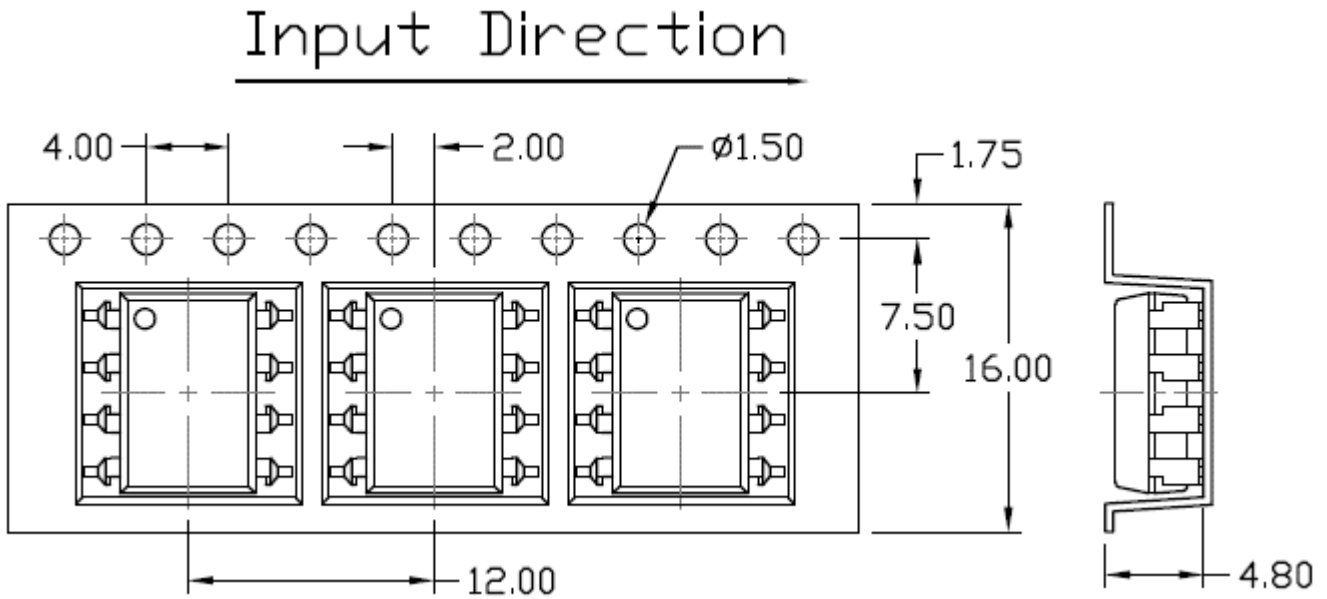
Reel Dimension *Dimensions in mm unless otherwise stated*



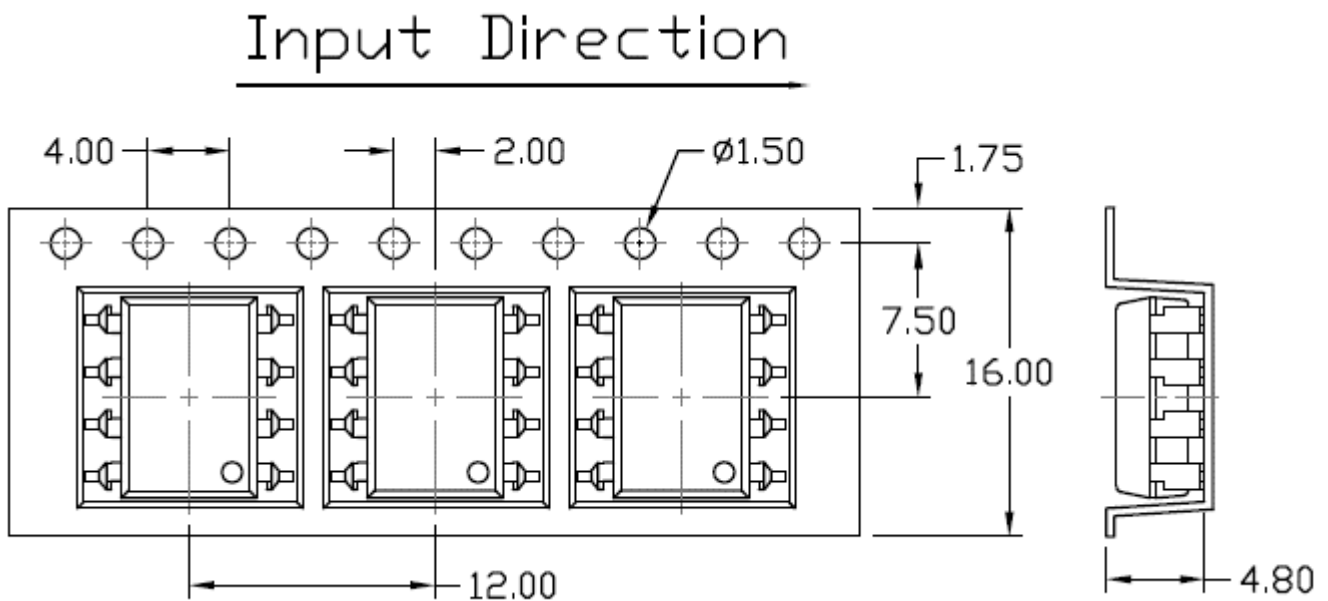


Carrier Tape Specifications *Dimensions in mm unless otherwise stated*

Option S(T1) & SL(T1)



Option S(T2) & SL(T2)





2.5A MOSFET/IGBT Gate Driver DMC-Isolator[®] Optocoupler

Solderability Specification (follow the JEDEC standard JESD22-B102)

Reflow Soldering: Immersed surface, other than the end of pin as cut-surface, must be covered by solder.

Solder-Bath: More than 95% of the electrode must be covered with solder.

Wave Soldering (follow the JEDEC standard JESD22-A111)

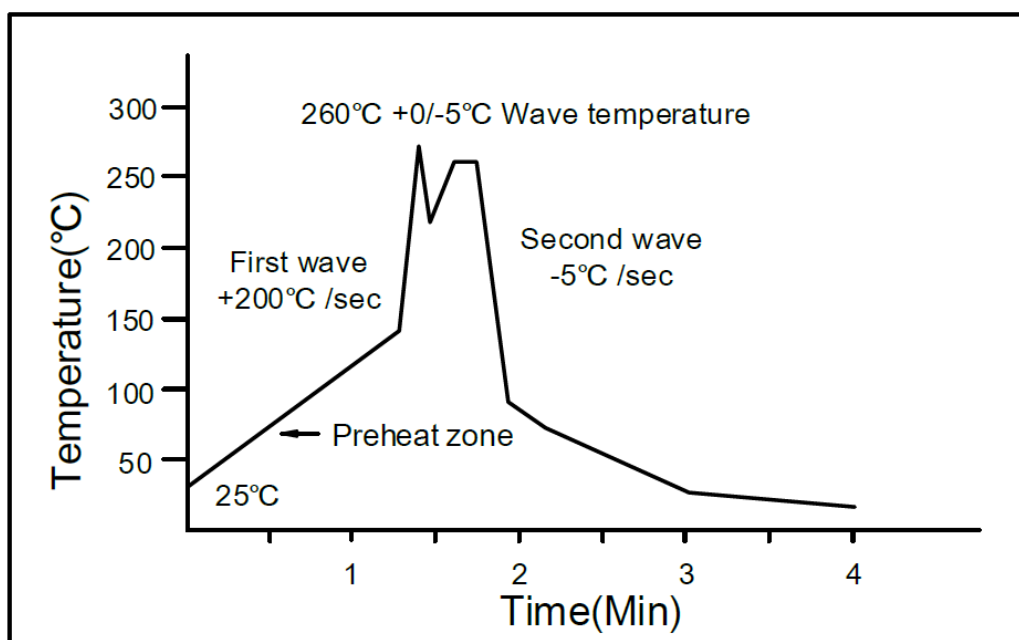
One time soldering is recommended within the condition of temperature.

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

Time: 10 sec.

Preheat temperature: 25 to 140°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.

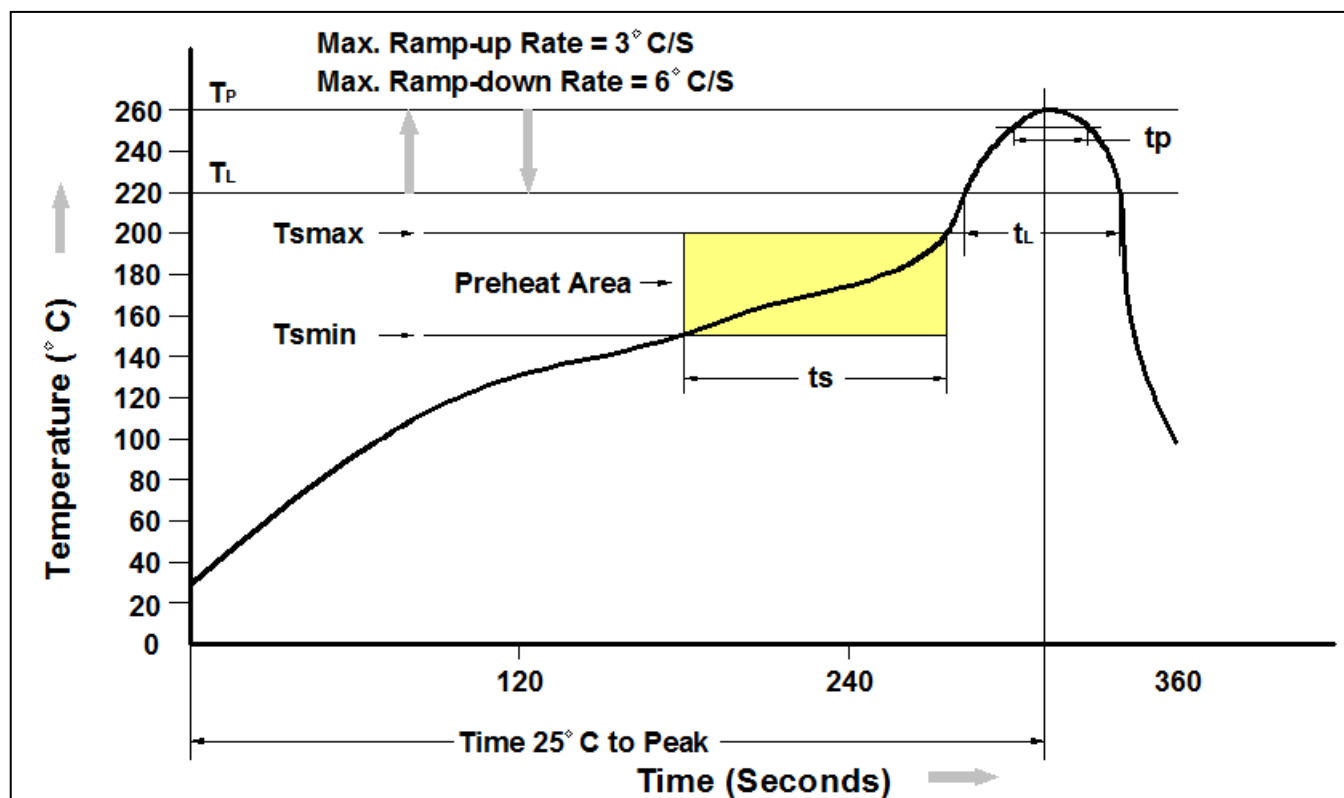
Temperature: $350 \pm 10^\circ\text{C}$

Time: 5 sec max.



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Reflow Profile (follow the JEDEC standard J-STD-020)



Profile Feature	Pb-Free Assembly Profile
Temperature Min. (T _{smin})	150°C
Temperature Max. (T _{smax})	200°C
Time (t _s) from (T _{smin} to T _{smax})	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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- 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*