



# High Temperature, 2.5 A Output Current, Gate Drive Optocoupler

## FOD3125

### Description

The FOD3125 is a 2.5 A Output Current Gate Drive Optocoupler, capable of driving most medium IGBTs or MOSFETs across extended industrial temperature range,  $-40^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . It is ideally suited for fast switching driving of power IGBTs and MOSFETs used in motor control inverter applications, and high performance power system.

It utilizes ON Semiconductor patented coplanar packaging technology, Optoplanar, and optimized IC design to achieve high noise immunity, characterized by high common mode rejection.

It consists of a gallium aluminum arsenide (AlGaAs) light emitting diode optically coupled to an integrated circuit with a high-speed driver for push-pull MOSFET output stage.

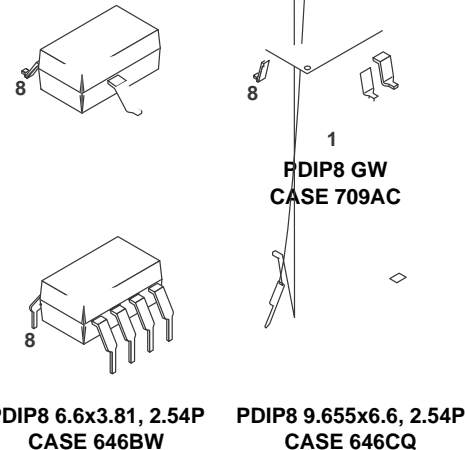
### Features

- Extended Industrial Temperature Range,  $-40^{\circ}\text{C}$  to  $125^{\circ}\text{C}$
- High Noise Immunity characterized by 35 kV/  $\mu\text{s}$  minimum Common Mode Rejection
- 2.5 A Peak Output Current Driving Capability for Most 1200 V/ 20 A IGBT
- Use of P-channel MOSFETs at Output Stage Enables Output Voltage Swing close to the Supply Rail
- Wide Supply Voltage Range from 15 V to 30 V
- Fast Switching Speed
  - ◆ 400 ns maximum Propagation Delay
  - ◆ 100 ns maximum Pulse Width Distortion
- Under Voltage LockOut (UVLO) with Hysteresis
- Safety and Regulatory Approvals
  - ◆ UL1577, 5000  $V_{\text{RMS}}$  for 1 minute
  - ◆ DIN EN/IEC60747-5-5 (pending approval)
- >8.0 mm Clearance and Creepage Distance (Option 'T' or 'TS')
- 1,414 V Peak Working Insulation Voltage (VIORM)
- This is a Pb-Free Device

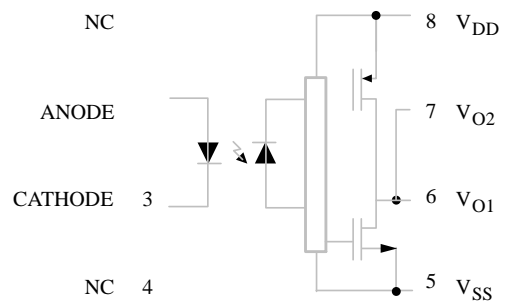
### Applications

- Industrial Inverter
- Uninterruptible Power Supply
- Induction Heating
- Isolated IGBT/Power MOSFET Gate Drive

Table 1. TRUTH TABLE



### FUNCTIONAL BLOCK DIAGRAM



Note: A 0.1  $\mu\text{F}$  bypass capacitor must be connected between pins 5 and 8.

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**Table 2. PIN DEFINITIONS**

Pin #	Name	Description
1	NC	Not Connected
2	Anode	LED Anode
3	Cathode	LED Cathode
4	NC	Not Connected
5	VSS	Negative Supply Voltage
6	VO2	Output Voltage 2 (internally connected to $V_{O1}$ )
7	VO1	Output Voltage 1
8	VDD	Positive Supply Voltage

**Table 3. SAFETY AND INSULATION RATINGS**

A

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**Table 4. ABSOLUTE MAXIMUM RATINGS** ( $T_A = 25^\circ\text{C}$  unless otherwise specified.)

Symbol	Parameter	Value	Units
$T_{STG}$	Storage Temperature	-40 to +125	$^\circ\text{C}$
$T_{OPR}$	Operating Temperature	-40 to +125	$^\circ\text{C}$
$T_J$	Junction Temperature	-40 to +125	$^\circ\text{C}$
$T_{SOL}$	Lead Wave Solder Temperature (refer to page 12 for reflow solder profile)	260 for 10 sec	$^\circ\text{C}$
$I_{F(AVG)}$	Average Input Current	25	mA
f	Operating Frequency <sup>(1)</sup>	50	kHz
$V_R$	Reverse Input Voltage	5	V
$I_{O(PEAK)}$	Peak Output Current <sup>(2)</sup>	3	A
$V_{DD} - V_{SS}$	Supply Voltage	0 to 35	V

$T_A \geq 90^\circ\text{C}$

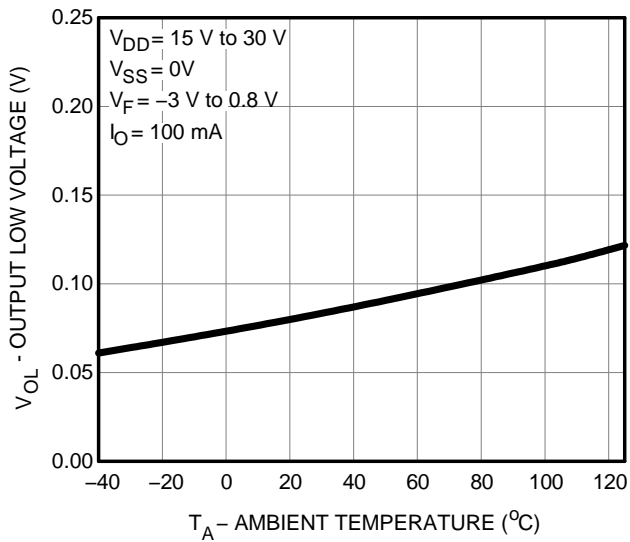
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**Table 7. ELECTRICAL CHARACTERISTICS** (continued)

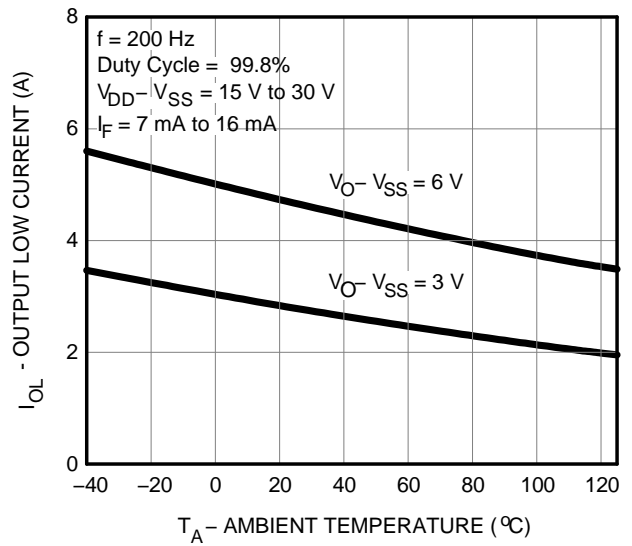
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
C <sub>IN</sub>	Input Capacitance	f = 1 MHz, V <sub>F</sub> = 0 V		20		pF
I <sub>OH</sub>	High Level Output Current <sup>(1)</sup>	V <sub>O</sub> = V <sub>DD</sub> - 3 V	-1.0	-2.0		A
		V <sub>O</sub> = V <sub>DD</sub> - 6 V	-2.0			



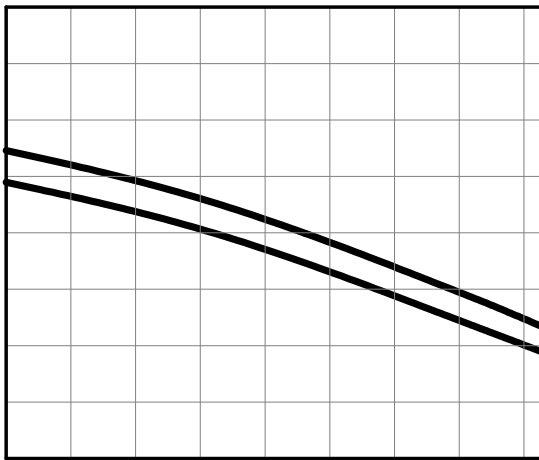
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**Figure 5. Output Low Voltage vs. Ambient Temperature**



**Figure 6. Output Low Current vs. Ambient Temperature**



**Figure 7. Supply Current vs. Ambient Temperature**

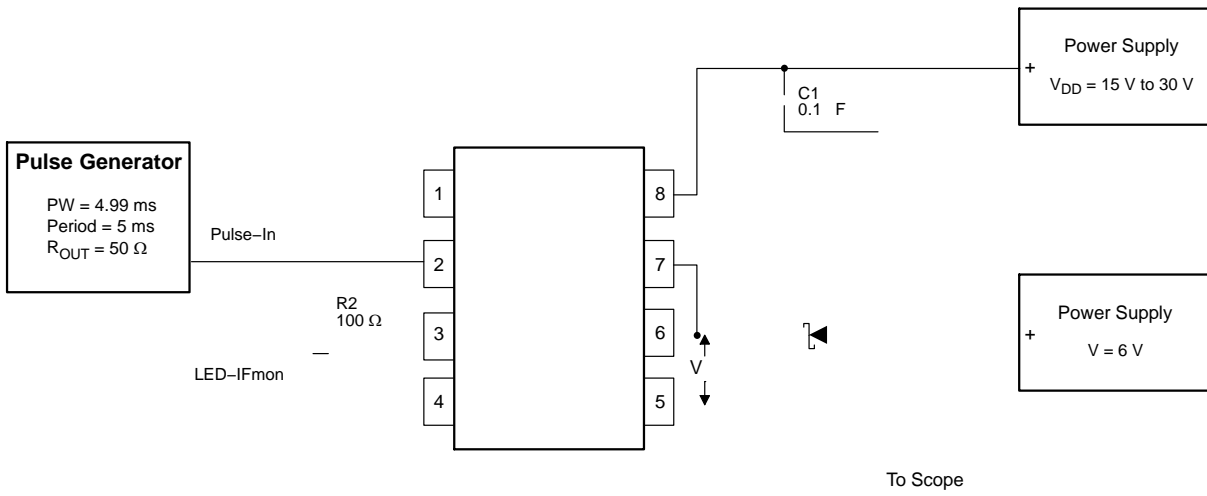
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## TEST CIRCUIT



### Test Conditions:

Frequency = 200 Hz

Duty Cycle = 99.8 %

V<sub>DD</sub>

SS

F<sub>(OFF)</sub> = -3.0 V to 0.8 V

Figure 18. I<sub>OL</sub> Test Circuit

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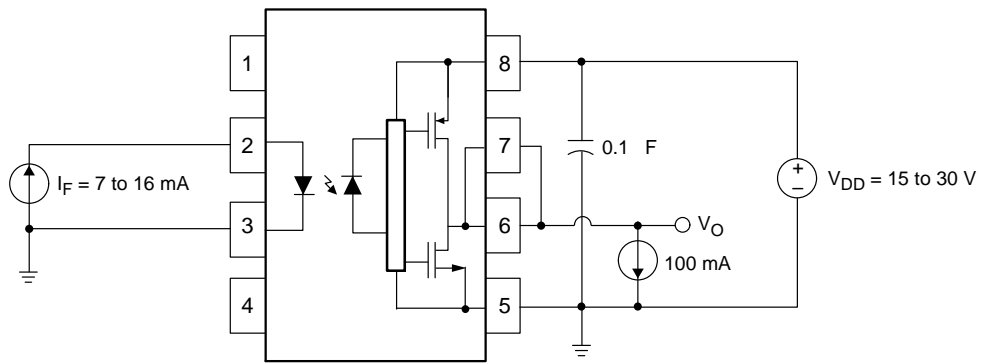


Figure 20.  $V_{OH}$  Test Circuit

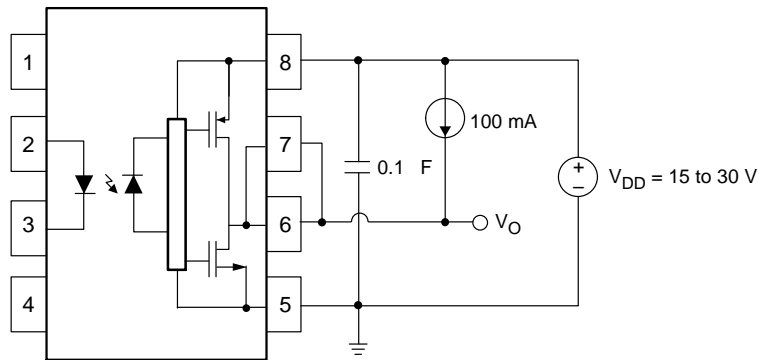


Figure 21.  $V_{OL}$  Test Circuit

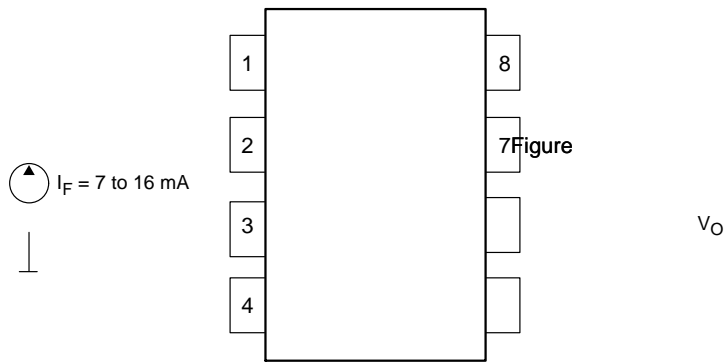


Figure 22.  $I_{DDH}$  Test Circuit

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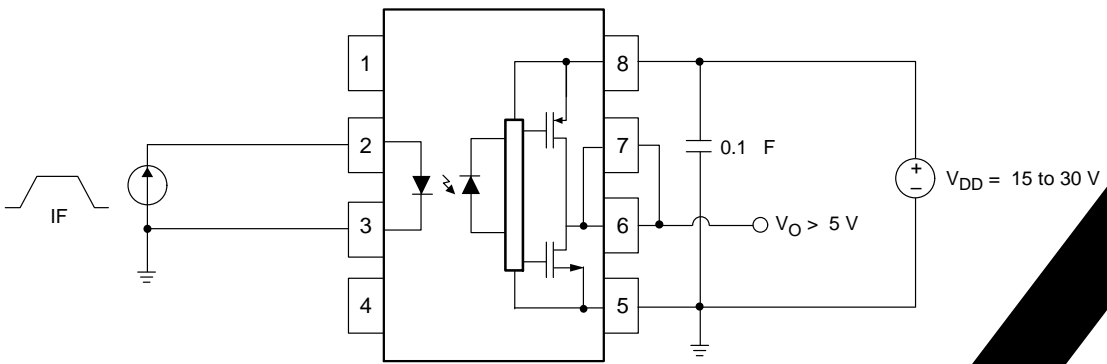


Figure 24.  $I_{FLH}$  Test Circuit

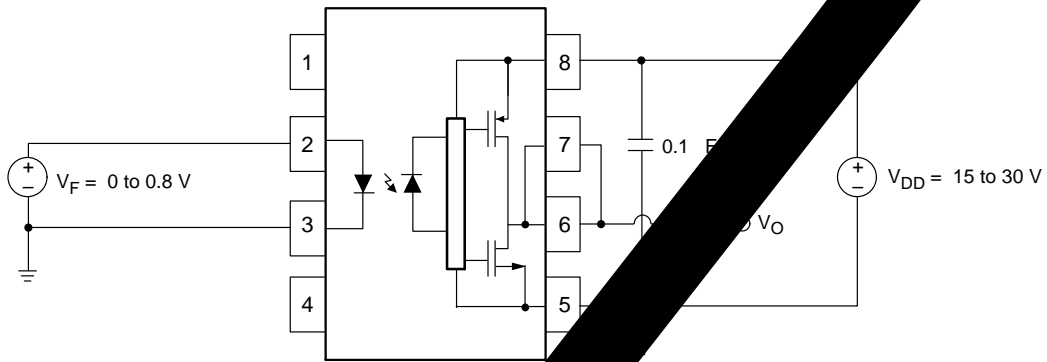


Figure 25.  $V_F$  Test Circuit

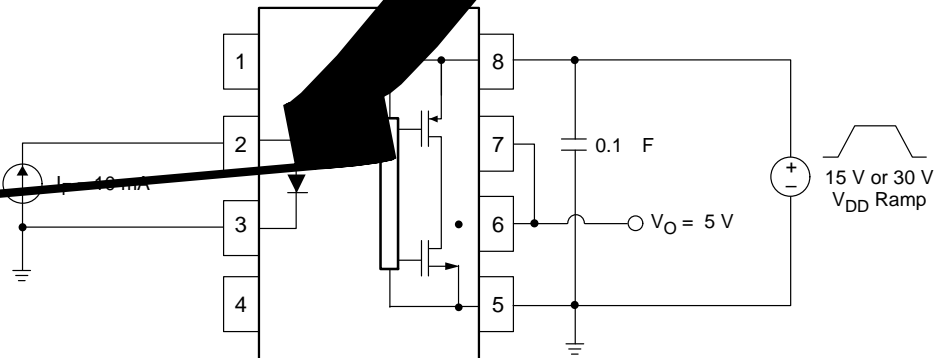


Figure 26. UVLO Test Circuit

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## REFLOW PROFILE

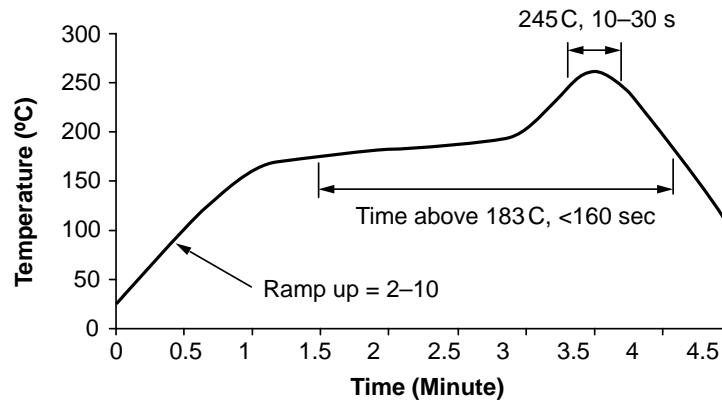


Figure 29. Reflow Profile

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## CARRIER TAPE SPECIFICATIONS (OPTION SD)

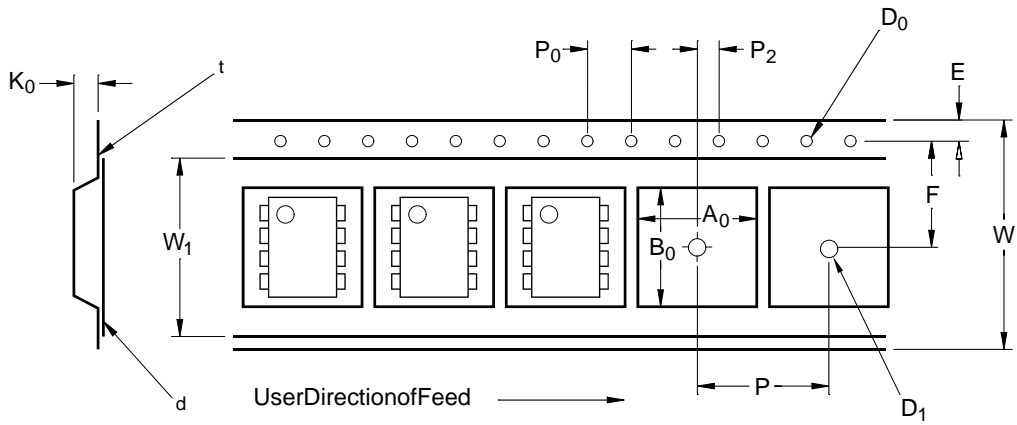


Figure 31. Carrier Tape Specifications

Symbol	Description	Dimension in mm
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**FOD3125**

**PACKAGE DIMENSIONS (OPTION TS)**

**PDIP8 GW**  
CASE 709AD

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## PACKAGE DIMENSIONS (OPTION T)

**PDIP8 6.6x3.81, 2.54P**  
CASE 646BW  
ISSUE O

### NOTES:

- A) NO STANDARD APPLIES TO THIS PACKAGE
- B) ALL DIMENSIC

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## PACKAGE DIMENSIONS

**PDIP8 9.655x6.6, 2.54P**  
CASE 646CQ  
ISSUE O

### NOTES:

- A) NO STANDARD APPLIES TO THIS PACKAGE
- B) ALL DIMENSIL