

# FOD3120

## High Noise Immunity, 2.5A Output Current, Gate Drive Optocoupler

### Features

- High noise immunity characterized by 35kV/μs minimum common mode rejection
- 2.5A peak output current driving capability for most 1200V/20A IGBT
- Use of P-channel MOSFETs at output stage enables output voltage swing close to the supply rail
- Wide supply voltage range from 15V to 30V
- Fast switching speed
  - 400ns max. propagation delay
  - 100ns max. pulse width distortion
- Under Voltage LockOut (UVLO) with hysteresis
- Extended industrial temperature range, -40°C to 100°C temperature range
- Safety and regulatory approved
  - UL1577, 5000 V<sub>RMS</sub> for 1 min.
  - IEC60747-5-2
- R<sub>DS(ON)</sub> of 1Ω (typ.) offers lower power dissipation
- >8.0mm clearance and creepage distance (option 'T' or 'TS')
- 1,414V Peak Working Insulation Voltage (V<sub>IORM</sub>)

### Applications

- Industrial inverter
- Uninterruptible power supply
- Induction heating
- Isolated IGBT/Power MOSFET gate drive

### Description

The FOD3120 is a 2.5A Output Current Gate Drive Optocoupler, capable of driving most 1200V/20A IGBT/MOSFET. It is ideally suited for fast switching driving of power IGBT and MOSFETs used in motor control inverter applications, and high performance power system.

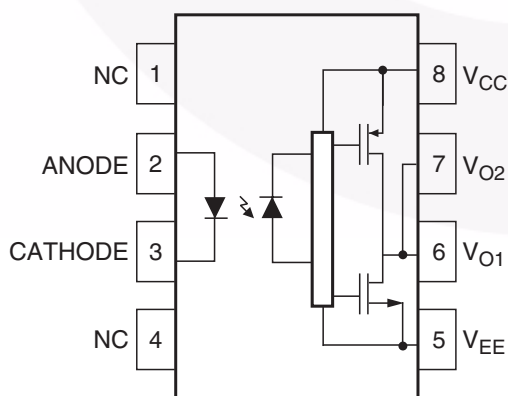
It utilizes Fairchild's proprietary coplanar packaging technology, Optoplanar®, and optimized IC design to achieve high noise immunity, characterized by high common mode rejection.

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.

### Related Resources

- FOD3150, 1A Output Current, Gate Drive Optocoupler Datasheet
- [www.fairchildsemi.com/products/opto/](http://www.fairchildsemi.com/products/opto/)

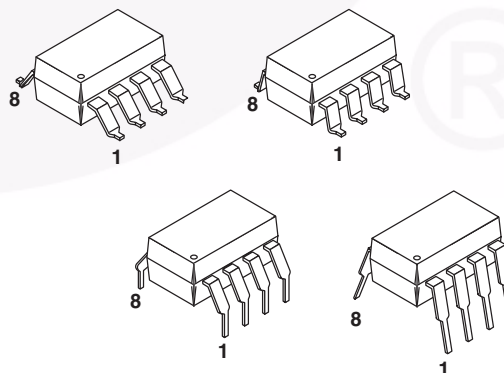
### Functional Block Diagram



**Note:**

A 0.1μF bypass capacitor must be connected between pins 5 and 8.

### Package Outlines



**Truth Table**

| LED | $V_{CC} - V_{EE}$ “Positive Going”<br>(Turn-on) | $V_{CC} - V_{EE}$ “Negative Going”<br>(Turn-off) | $V_O$      |
|-----|-------------------------------------------------|--------------------------------------------------|------------|
| Off | 0V to 30V                                       | 0V to 30V                                        | Low        |
| On  | 0V to 11.5V                                     | 0V to 10V                                        | Low        |
| On  | 11.5V to 13.5V                                  | 10V to 12V                                       | Transition |
| On  | 13.5V to 30V                                    | 12V to 30V                                       | High       |

**Pin Definitions**

| Pin # | Name     | Description                                          |
|-------|----------|------------------------------------------------------|
| 1     | NC       | Not Connected                                        |
| 2     | Anode    | LED Anode                                            |
| 3     | Cathode  | LED Cathode                                          |
| 4     | NC       | Not Connected                                        |
| 5     | $V_{EE}$ | Negative Supply Voltage                              |
| 6     | $V_{O2}$ | Output Voltage 2 (internally connected to $V_{O1}$ ) |
| 7     | $V_{O1}$ | Output Voltage 1                                     |
| 8     | $V_{CC}$ | Positive Supply Voltage                              |

## Safety and Insulation Ratings

As per IEC 60747-5-2. This optocoupler is suitable for “safe electrical insulation” only within the safety limit data. Compliance with the safety ratings shall be ensured by means of protective circuits.

| Symbol         | Parameter                                                                                                                                          | Min.   | Typ.      | Max. | Unit       |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------|--------|-----------|------|------------|
|                | Installation Classifications per DIN VDE 0110/1.89 Table 1                                                                                         |        |           |      |            |
|                | For Rated Mains Voltage < 150Vrms                                                                                                                  |        | I–IV      |      |            |
|                | For Rated Mains Voltage < 300Vrms                                                                                                                  |        | I–IV      |      |            |
|                | For Rated Mains Voltage < 450Vrms                                                                                                                  |        | I–III     |      |            |
|                | For Rated Mains Voltage < 600Vrms                                                                                                                  |        | I–III     |      |            |
|                | For Rated Mains Voltage < 1000Vrms (Option T, TS)                                                                                                  |        | I–III     |      |            |
|                | Climatic Classification                                                                                                                            |        | 40/100/21 |      |            |
|                | Pollution Degree (DIN VDE 0110/1.89)                                                                                                               |        | 2         |      |            |
| CTI            | Comparative Tracking Index                                                                                                                         | 175    |           |      |            |
| $V_{PR}$       | Input to Output Test Voltage, Method b,<br>$V_{IORM} \times 1.875 = V_{PR}$ , 100% Production Test with<br>$t_m = 1$ sec., Partial Discharge < 5pC | 2651   |           |      |            |
|                | Input to Output Test Voltage, Method a,<br>$V_{IORM} \times 1.5 = V_{PR}$ , Type and Sample Test with<br>$t_m = 60$ sec., Partial Discharge < 5 pC | 2121   |           |      |            |
| $V_{IORM}$     | Max Working Insulation Voltage                                                                                                                     | 1,414  |           |      | $V_{peak}$ |
| $V_{IOTM}$     | Highest Allowable Over Voltage                                                                                                                     | 6000   |           |      | $V_{peak}$ |
|                | External Creepage                                                                                                                                  | 8      |           |      | mm         |
|                | External Clearance                                                                                                                                 | 7.4    |           |      | mm         |
|                | External Clearance (for Option T or TS - 0.4" Lead Spacing)                                                                                        | 10.16  |           |      | mm         |
|                | Insulation Thickness                                                                                                                               | 0.5    |           |      | mm         |
| $T_{Case}$     | Safety Limit Values – Maximum Values Allowed in the<br>Event of a Failure                                                                          |        |           |      |            |
|                | Case Temperature                                                                                                                                   | 150    |           |      | °C         |
| $I_{S,INPUT}$  | Input Current                                                                                                                                      | 25     |           |      | mA         |
| $P_{S,OUTPUT}$ | Output Power (Duty Factor $\leq 2.7\%$ )                                                                                                           | 250    |           |      | mW         |
| $R_{IO}$       | Insulation Resistance at $T_S$ , $V_{IO} = 500V$                                                                                                   | $10^9$ |           |      | $\Omega$   |

**Absolute Maximum Ratings** ( $T_A = 25^\circ\text{C}$  unless otherwise specified)

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

| Symbol                                  | Parameter                                                                    | Value                                  | Units            |
|-----------------------------------------|------------------------------------------------------------------------------|----------------------------------------|------------------|
| $T_{\text{STG}}$                        | Storage Temperature                                                          | -55 to +125                            | $^\circ\text{C}$ |
| $T_{\text{OPR}}$                        | Operating Temperature                                                        | -40 to +100                            | $^\circ\text{C}$ |
| $T_J$                                   | Junction Temperature                                                         | -40 to +125                            | $^\circ\text{C}$ |
| $T_{\text{SOL}}$                        | Lead Wave Solder Temperature<br>(refer to page 21 for reflow solder profile) | 260 for 10sec                          | $^\circ\text{C}$ |
| $I_{\text{F(AVG)}}$                     | Average Input Current                                                        | 25                                     | mA               |
| $I_{\text{F(PEAK)}}$                    | Peak Transient Forward Current <sup>(10)</sup>                               | 1                                      | A                |
| f                                       | Operating Frequency <sup>(11)</sup>                                          | 50                                     | kHz              |
| $V_R$                                   | Reverse Input Voltage                                                        | 5                                      | V                |
| $I_{\text{O(PEAK)}}$                    | Peak Output Current <sup>(1)</sup>                                           | 3.0                                    | A                |
| $V_{\text{CC}} - V_{\text{EE}}$         | Supply Voltage                                                               | 0 to 35                                | V                |
|                                         |                                                                              | $T_A \geq 90^\circ\text{C}$<br>0 to 30 |                  |
| $V_{\text{O(PEAK)}}$                    | Peak Output Voltage                                                          | 0 to $V_{\text{CC}}$                   | V                |
| $t_{\text{R(IN)}}$ , $t_{\text{F(IN)}}$ | Input Signal Rise and Fall Time                                              | 500                                    | ns               |
| $\text{PD}_I$                           | Input Power Dissipation <sup>(2)(4)</sup>                                    | 45                                     | mW               |
| $\text{PD}_O$                           | Output Power Dissipation <sup>(3)(4)</sup>                                   | 250                                    | mW               |

**Recommended Operating Conditions**

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. Fairchild does not recommend exceeding them or designing to absolute maximum ratings.

| Symbol                          | Parameter                     | Value       | Units            |
|---------------------------------|-------------------------------|-------------|------------------|
| $T_A$                           | Ambient Operating Temperature | -40 to +100 | $^\circ\text{C}$ |
| $V_{\text{CC}} - V_{\text{EE}}$ | Power Supply                  | 15 to 30    | V                |
| $I_{\text{F(ON)}}$              | Input Current (ON)            | 7 to 16     | mA               |
| $V_{\text{F(OFF)}}$             | Input Voltage (OFF)           | 0 to 0.8    | V                |

**Isolation Characteristics**

Apply over all recommended conditions, typical value is measured at  $T_A = 25^\circ\text{C}$

| Symbol           | Parameter                      | Conditions                                                                                                                   | Min. | Typ.      | Max. | Units            |
|------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------|------|-----------|------|------------------|
| $V_{\text{ISO}}$ | Input-Output Isolation Voltage | $T_A = 25^\circ\text{C}$ , R.H. < 50%, $t = 1.0\text{min}$ ,<br>$I_{\text{I-O}} \leq 10\mu\text{A}$ , 50Hz <sup>(5)(6)</sup> | 5000 |           |      | $V_{\text{RMS}}$ |
| $R_{\text{ISO}}$ | Isolation Resistance           | $V_{\text{I-O}} = 500\text{V}^{(5)}$                                                                                         |      | $10^{11}$ |      | $\Omega$         |
| $C_{\text{ISO}}$ | Isolation Capacitance          | $V_{\text{I-O}} = 0\text{V}$ , Freq = 1.0MHz <sup>(5)</sup>                                                                  |      | 1         |      | pF               |

## Electrical Characteristics

Apply over all recommended conditions, typical value is measured at  $V_{CC} = 30V$ ,  $V_{EE} = \text{Ground}$ ,  $T_A = 25^\circ\text{C}$  unless otherwise specified.

| Symbol              | Parameter                                  | Conditions                                              | Min.             | Typ.            | Max.             | Units                |
|---------------------|--------------------------------------------|---------------------------------------------------------|------------------|-----------------|------------------|----------------------|
| $V_F$               | Input Forward Voltage                      | $I_F = 10\text{mA}$                                     | 1.2              | 1.5             | 1.8              | V                    |
| $\Delta(V_F / T_A)$ | Temperature Coefficient of Forward Voltage |                                                         |                  | -1.8            |                  | mV/ $^\circ\text{C}$ |
| $BV_R$              | Input Reverse Breakdown Voltage            | $I_R = 10\mu\text{A}$                                   | 5                |                 |                  | V                    |
| $C_{IN}$            | Input Capacitance                          | $f = 1\text{MHz}$ , $V_F = 0V$                          |                  | 60              |                  | pF                   |
| $I_{OH}$            | High Level Output Current <sup>(1)</sup>   | $V_O = V_{CC} - 3V$                                     | -1               | -2.0            | -2.5             | A                    |
|                     |                                            | $V_O = V_{CC} - 6V$                                     | -2.0             |                 | -2.5             |                      |
| $I_{OL}$            | Low Level Output Current <sup>(1)</sup>    | $V_O = V_{EE} + 3V$                                     | 1                | 2.0             | 2.5              | A                    |
|                     |                                            | $V_O = V_{EE} + 6V$                                     | 2.0              |                 | 2.5              |                      |
| $V_{OH}$            | High Level Output Voltage                  | $I_F = 10\text{mA}$ , $I_O = -2.5\text{A}$              | $V_{CC} - 6.25V$ | $V_{CC} - 2.5V$ |                  | V                    |
|                     |                                            | $I_F = 10\text{mA}$ , $I_O = -100\text{mA}$             | $V_{CC} - 0.25V$ | $V_{CC} - 0.1V$ |                  |                      |
| $V_{OL}$            | Low Level Output Voltage                   | $I_F = 0\text{mA}$ , $I_O = 2.5\text{A}$                |                  | $V_{EE} + 2.5V$ | $V_{EE} + 6.25V$ | V                    |
|                     |                                            | $I_F = 0\text{mA}$ , $I_O = 100\text{mA}$               |                  | $V_{EE} + 0.1V$ | $V_{EE} + 0.25V$ |                      |
| $I_{CCH}$           | High Level Supply Current                  | $V_O = \text{Open}$ , $I_F = 7 \text{ to } 16\text{mA}$ |                  | 2.8             | 3.8              | mA                   |
| $I_{CCL}$           | Low Level Supply Current                   | $V_O = \text{Open}$ , $V_F = 0 \text{ to } 0.8V$        |                  | 2.8             | 3.8              | mA                   |
| $I_{FLH}$           | Threshold Input Current Low to High        | $I_O = 0\text{mA}$ , $V_O > 5V$                         |                  | 2.3             | 5.0              | mA                   |
| $V_{FHL}$           | Threshold Input Voltage High to Low        | $I_O = 0\text{mA}$ , $V_O < 5V$                         | 0.8              |                 |                  | V                    |
| $V_{UVLO+}$         | Under Voltage Lockout Threshold            | $I_F = 10\text{mA}$ , $V_O > 5V$                        | 11.5             | 12.7            | 13.5             | V                    |
| $V_{UVLO-}$         |                                            | $I_F = 10\text{mA}$ , $V_O < 5V$                        | 10.0             | 11.2            | 12.0             | V                    |
| $UVLO_{HYS}$        | Under Voltage Lockout Threshold Hysteresis |                                                         |                  | 1.5             |                  | V                    |

## Switching Characteristics

Apply over all recommended conditions, typical value is measured at  $V_{CC} = 30V$ ,  $V_{EE} = \text{Ground}$ ,  $T_A = 25^\circ\text{C}$  unless otherwise specified.

| Symbol          | Parameter                                                                                   | Conditions                                                                                                                | Min. | Typ. | Max. | Units                   |
|-----------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|------|------|------|-------------------------|
| $t_{PHL}$       | Propagation Delay Time to Logic Low Output                                                  | $I_F = 7\text{mA to } 16\text{mA}$ ,<br>$R_g = 10\Omega$ , $C_g = 10\text{nF}$ ,<br>$f = 10\text{kHz}$ , Duty Cycle = 50% | 150  | 275  | 400  | ns                      |
| $t_{PLH}$       | Propagation Delay Time to Logic High Output                                                 |                                                                                                                           | 150  | 255  | 400  | ns                      |
| PWD             | Pulse Width Distortion,<br>$ t_{PHL} - t_{PLH} $                                            |                                                                                                                           |      | 20   | 100  | ns                      |
| PDD (Skew)      | Propagation Delay Difference Between Any Two Parts or Channels, $(t_{PHL} - t_{PLH})^{(7)}$ |                                                                                                                           | -250 |      | 250  | ns                      |
| $t_r$           | Output Rise Time (10% – 90%)                                                                |                                                                                                                           |      | 60   |      | ns                      |
| $t_f$           | Output Fall Time (90% – 10%)                                                                |                                                                                                                           |      | 60   |      | ns                      |
| $t_{UVLO\ ON}$  | UVLO Turn On Delay                                                                          | $I_F = 10\text{mA}$ , $V_O > 5V$                                                                                          |      | 1.6  |      | $\mu\text{s}$           |
| $t_{UVLO\ OFF}$ | UVLO Turn Off Delay                                                                         | $I_F = 10\text{mA}$ , $V_O < 5V$                                                                                          |      | 0.4  |      | $\mu\text{s}$           |
| $ CM_H $        | Common Mode Transient Immunity at Output High                                               | $T_A = 25^\circ\text{C}$ , $V_{CC} = 30V$ ,<br>$I_F = 7 \text{ to } 16\text{mA}$ , $V_{CM} = 2000V^{(8)}$                 | 35   | 50   |      | $\text{kV}/\mu\text{s}$ |
| $ CM_L $        | Common Mode Transient Immunity at Output Low                                                | $T_A = 25^\circ\text{C}$ , $V_{CC} = 30V$ , $V_F = 0V$ ,<br>$V_{CM} = 2000V^{(9)}$                                        | 35   | 50   |      | $\text{kV}/\mu\text{s}$ |

### Notes:

- Maximum pulse width =  $10\mu\text{s}$ , maximum duty cycle = 1.1%
- Derate linearly above  $87^\circ\text{C}$ , free air temperature at a rate of  $0.77\text{mW}/^\circ\text{C}$
- No derating required across temperature range.
- Functional operation under these conditions is not implied. Permanent damage may occur if the device is subjected to conditions outside these ratings.
- Device is considered a two terminal device: Pins 2 and 3 are shorted together and Pins 5, 6, 7 and 8 are shorted together.
- $5,000 V_{RMS}$  for 1 minute duration is equivalent to  $6,000 V_{AC\ RMS}$  for 1 second duration.
- The difference between  $t_{PHL}$  and  $t_{PLH}$  between any two FOD3120 parts under same test conditions.
- Common mode transient immunity at output high is the maximum tolerable negative  $dV_{cm}/dt$  on the trailing edge of the common mode impulse signal,  $V_{cm}$ , to assure that the output will remain high (i.e.  $V_O > 15.0V$ ).
- Common mode transient immunity at output low is the maximum tolerable positive  $dV_{cm}/dt$  on the leading edge of the common pulse signal,  $V_{cm}$ , to assure that the output will remain low (i.e.  $V_O < 1.0V$ ).
- Pulse Width,  $P_W \leq 1\mu\text{s}$ , 300pps
- Exponential Waveform,  $I_{O(PEAK)} \leq |2.5A| (\leq 0.3\mu\text{s})$

## Typical Performance Curves

Fig. 1 Output High Voltage Drop vs. Output High Current

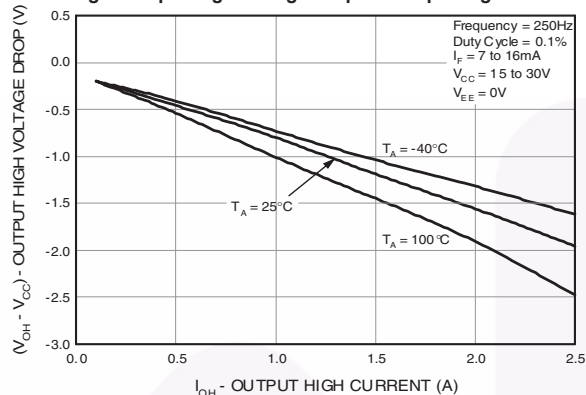


Fig. 2 Output High Voltage Drop vs. Ambient Temperature

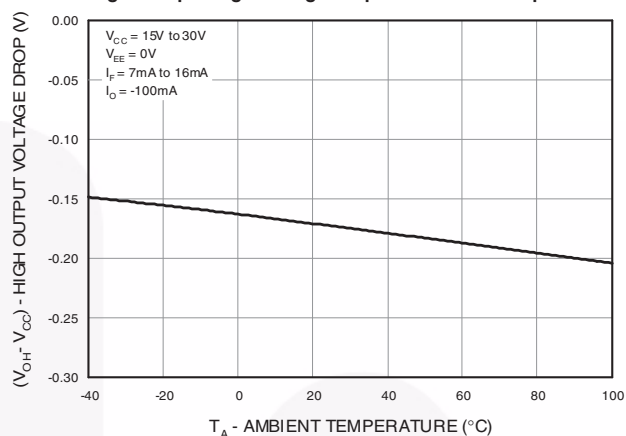


Fig. 3 Output High Current vs. Ambient Temperature

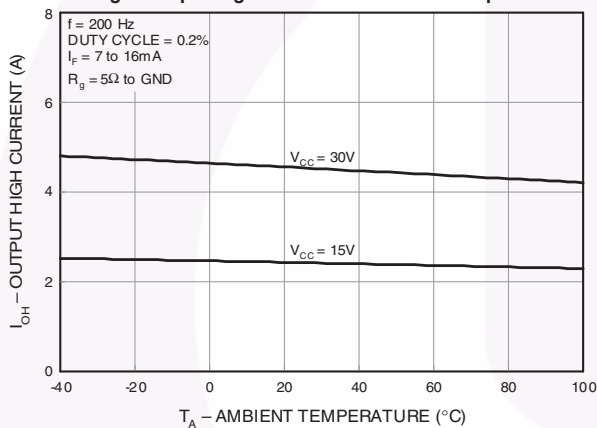


Fig. 4 Output High Current vs. Ambient Temperature

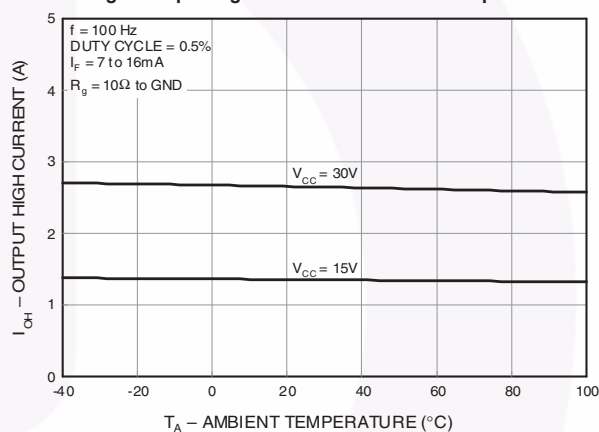


Fig. 5 Output Low Voltage vs. Output Low Current

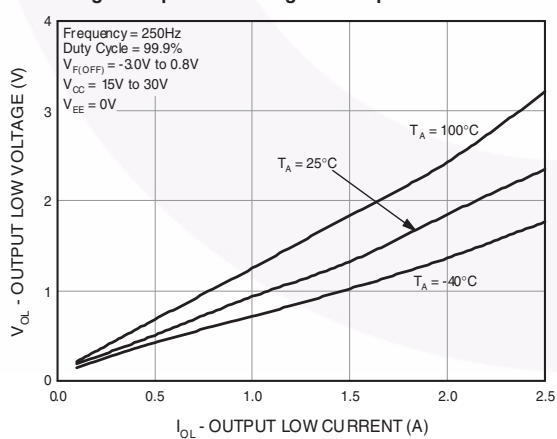
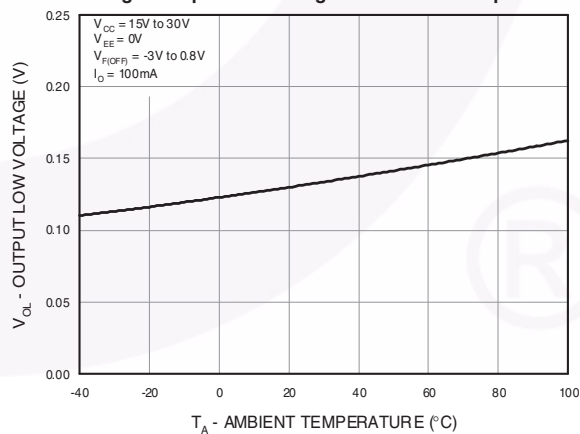


Fig. 6 Output Low Voltage vs. Ambient Temperature



## Typical Performance Curves (Continued)

Fig. 7 Output Low Current vs. Ambient Temperature

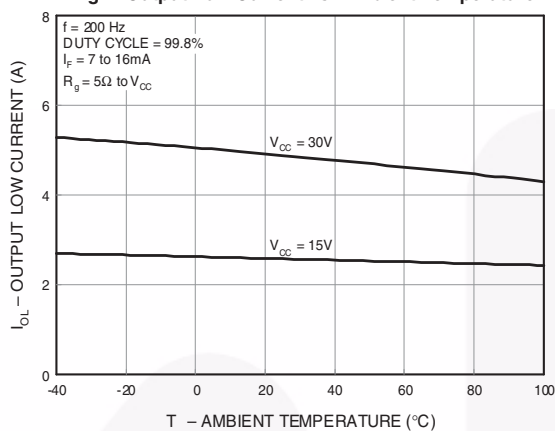


Fig. 8 Output Low Current vs. Ambient Temperature

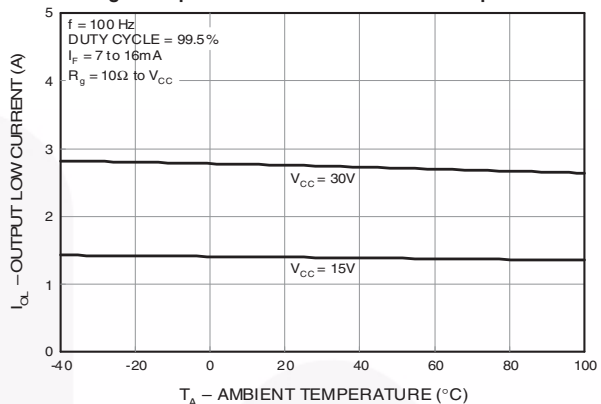


Fig. 9 Supply Current vs. Ambient Temperature

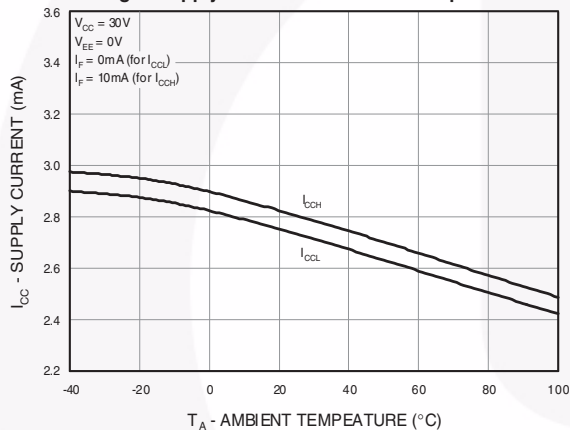


Fig. 10 Supply Current vs. Supply Voltage

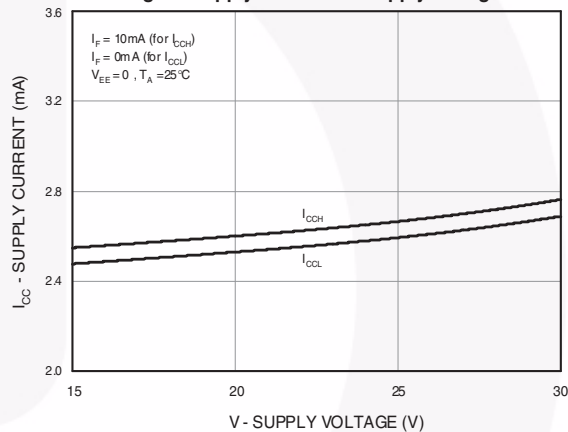


Fig. 11 Low to High Input Current Threshold vs. Ambient Temperature

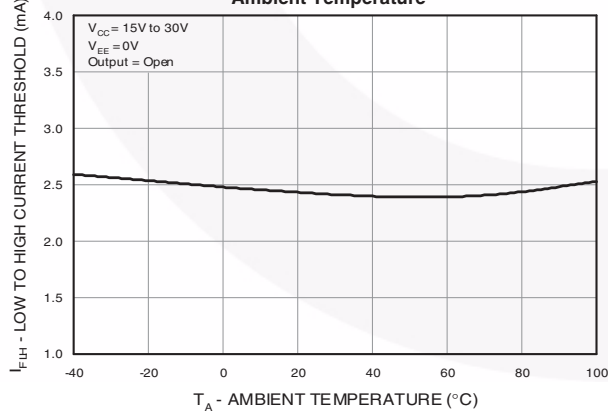
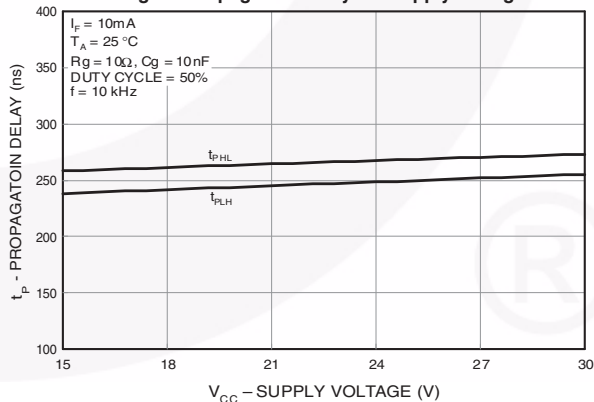


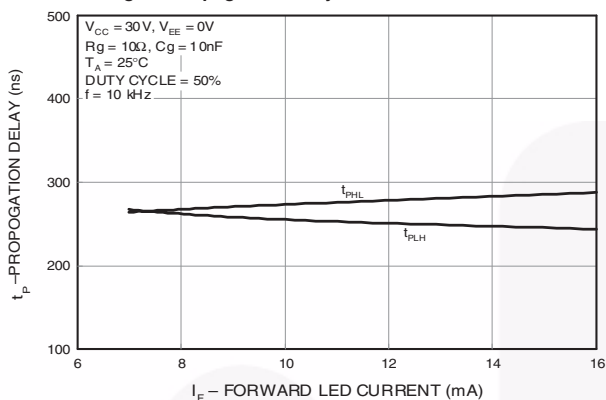
Fig. 12 Propagation Delay vs. Supply Voltage



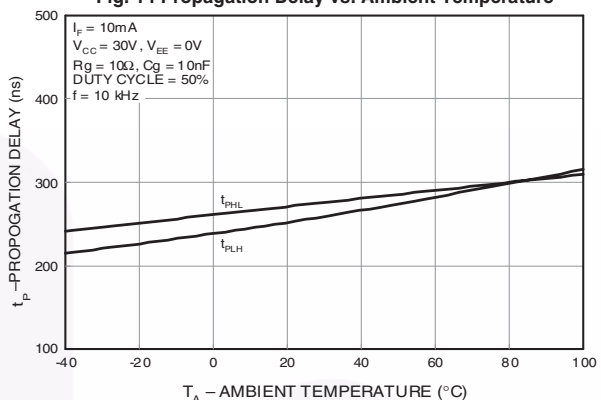


## Typical Performance Curves (Continued)

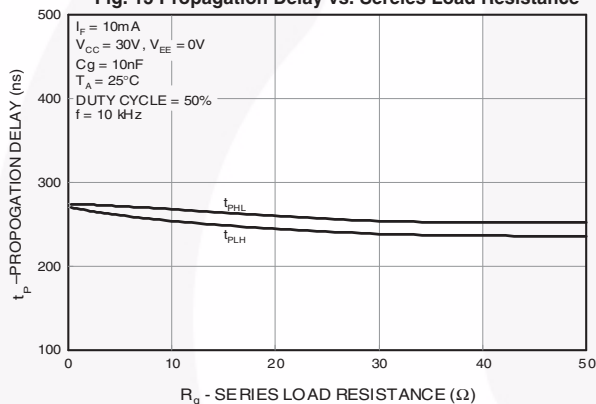
**Fig. 13 Propagation Delay vs. LED Forward Current**



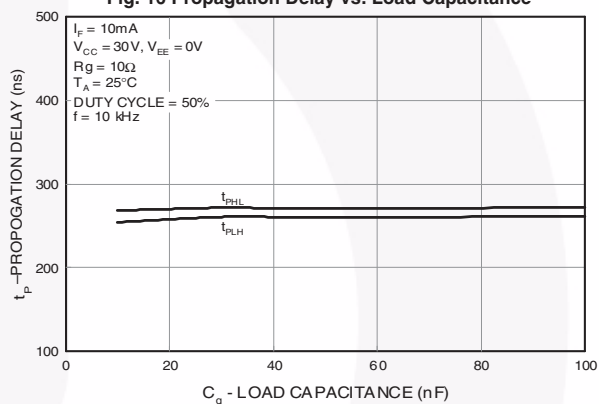
**Fig. 14 Propagation Delay vs. Ambient Temperature**



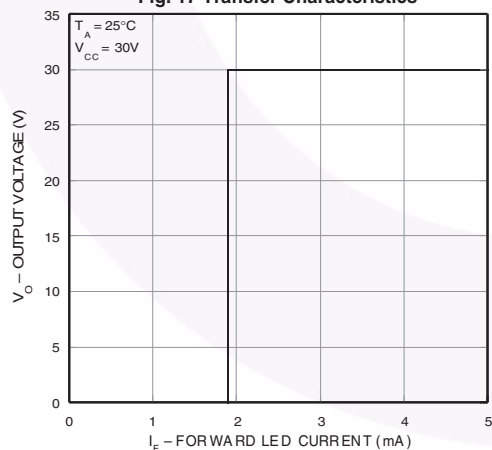
**Fig. 15 Propagation Delay vs. Series Load Resistance**



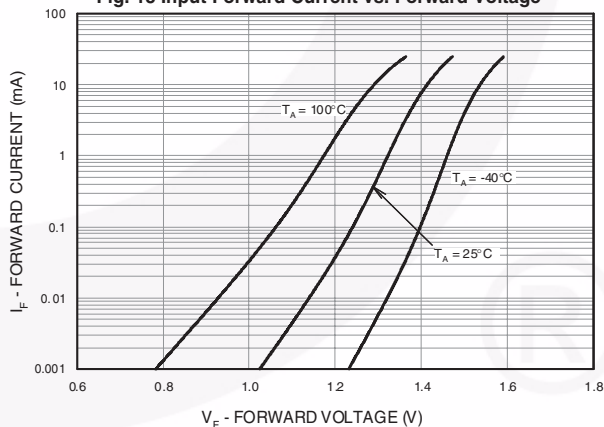
**Fig. 16 Propagation Delay vs. Load Capacitance**



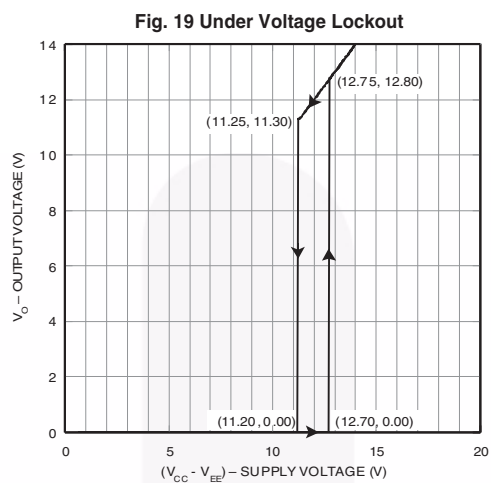
**Fig. 17 Transfer Characteristics**



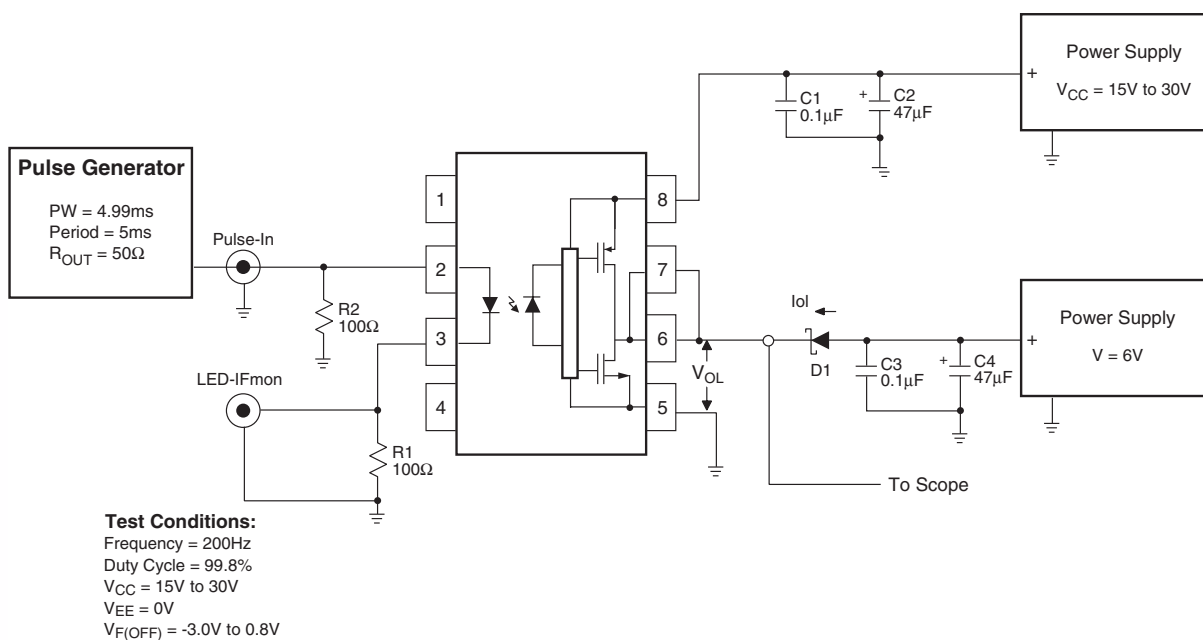
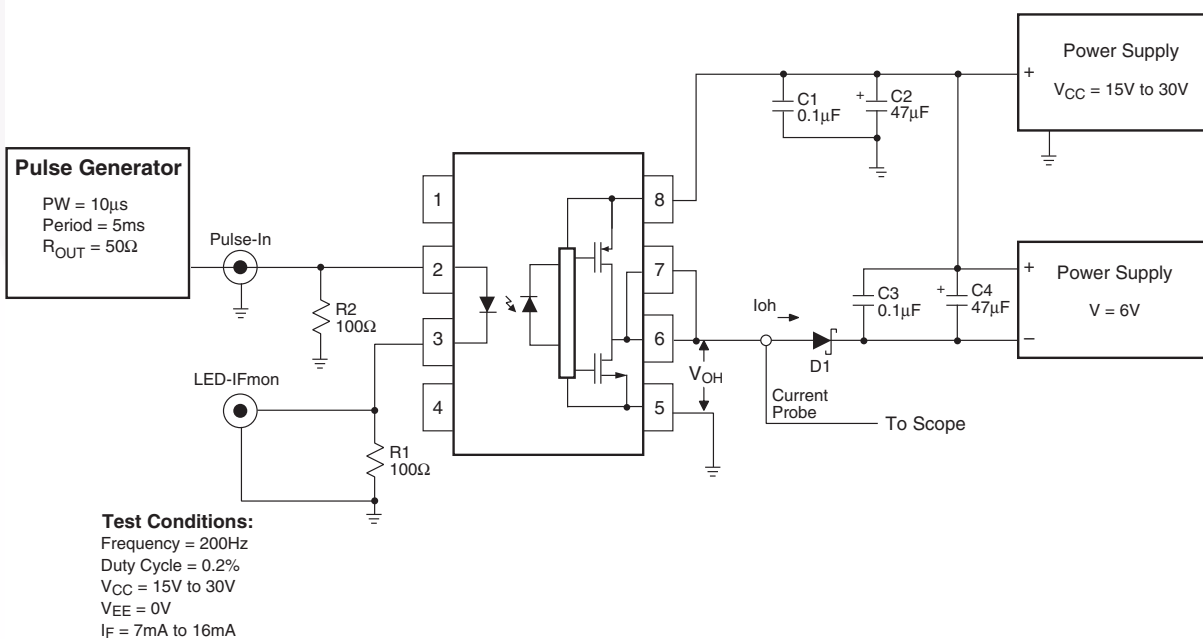
**Fig. 18 Input Forward Current vs. Forward Voltage**



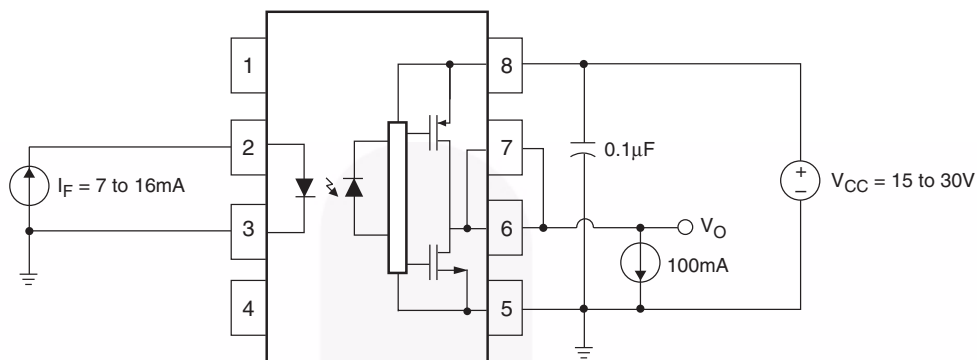
# Typical Performance Curves (Continued)



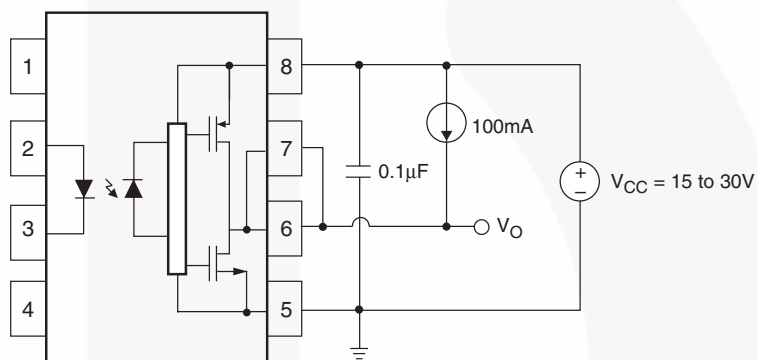
## Test Circuit

Figure 20.  $I_{OL}$  Test CircuitFigure 21.  $I_{OH}$  Test Circuit

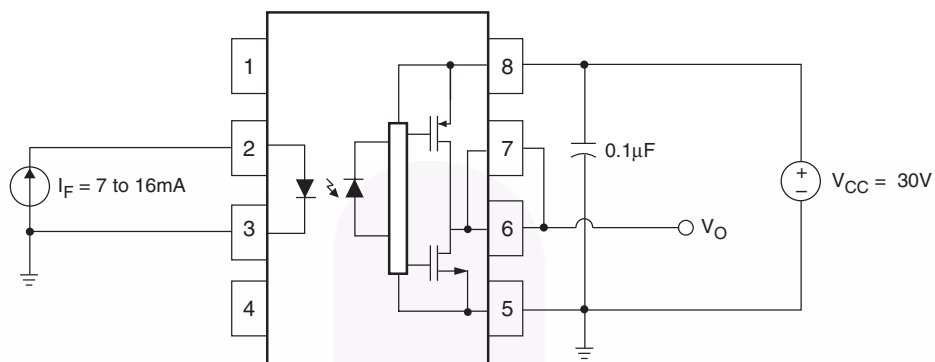
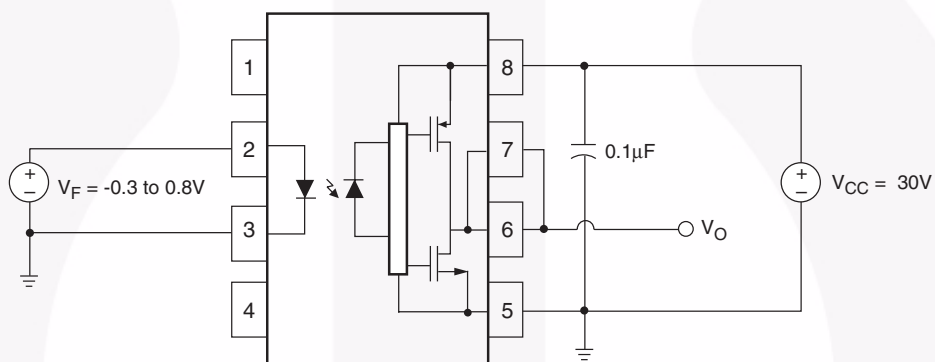
**Test Circuit** (Continued)



**Figure 22.  $V_{OH}$  Test Circuit**



**Figure 23.  $V_{OL}$  Test Circuit**

**Test Circuit** (Continued)**Figure 24.  $I_{CCH}$  Test Circuit****Figure 25.  $I_{CCL}$  Test Circuit**

# Test Circuit (Continued)

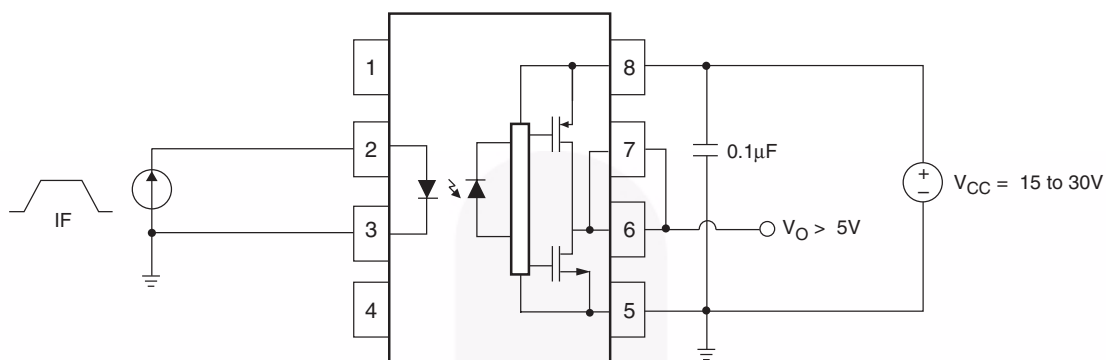


Figure 26.  $I_{FLH}$  Test Circuit

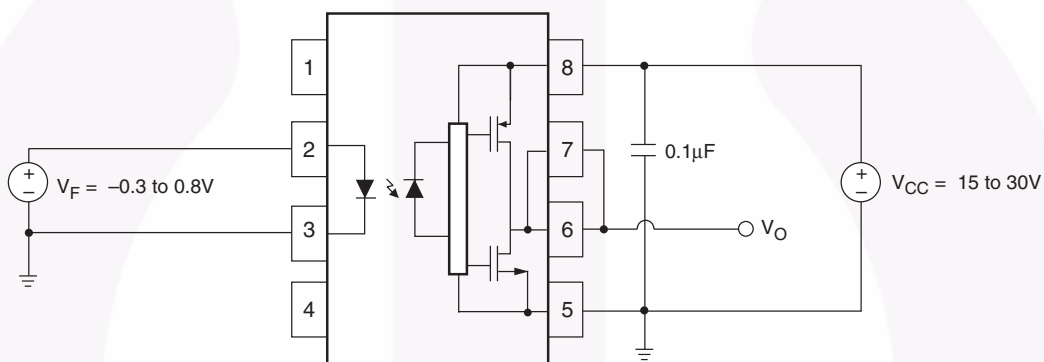


Figure 27.  $V_{FHL}$  Test Circuit

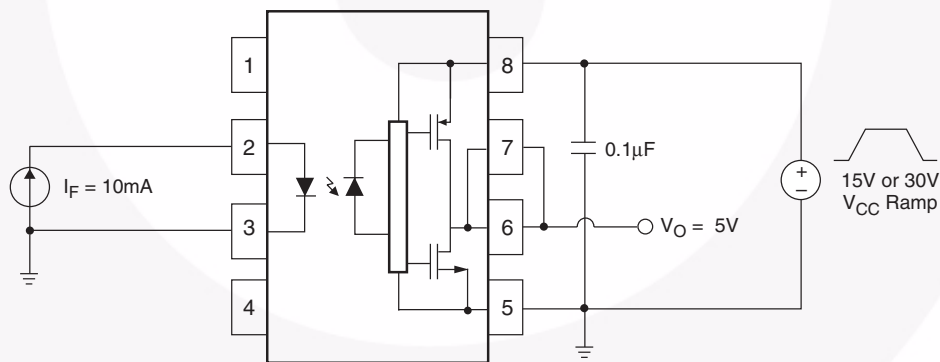
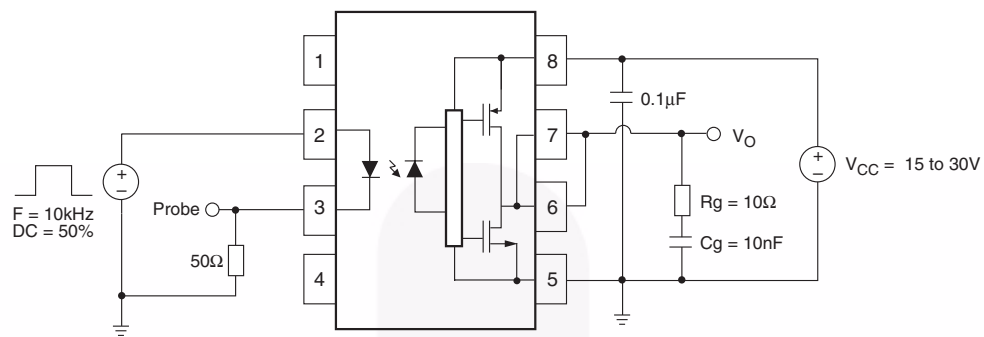
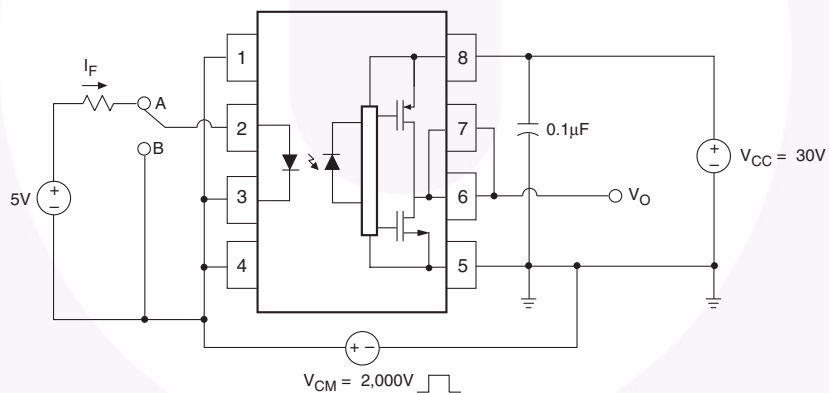


Figure 28. UVLO Test Circuit

## Test Circuit (Continued)



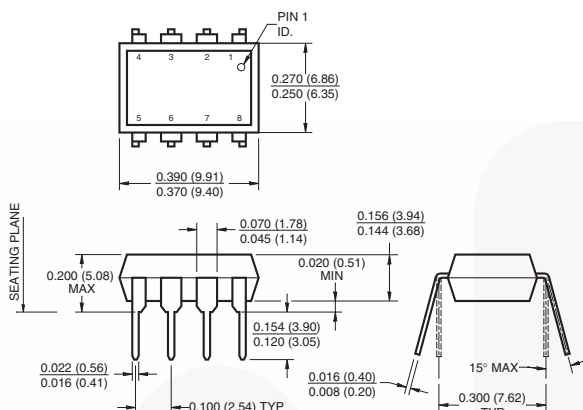
**Figure 29.  $t_{PHL}$ ,  $t_{PLH}$ ,  $t_R$  and  $t_F$  Test Circuit and Waveforms**



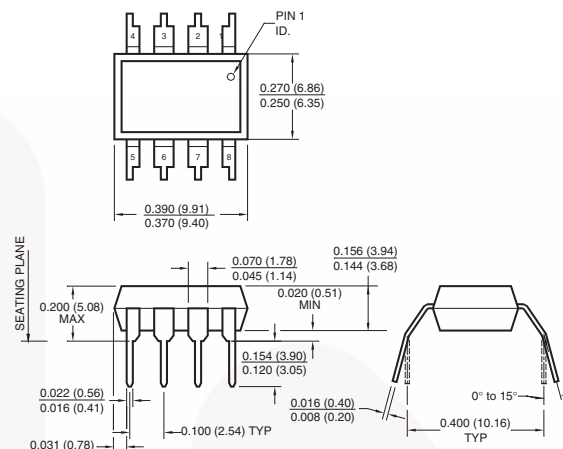
**Figure 30. CMR Test Circuit and Waveforms**

## Package Dimensions

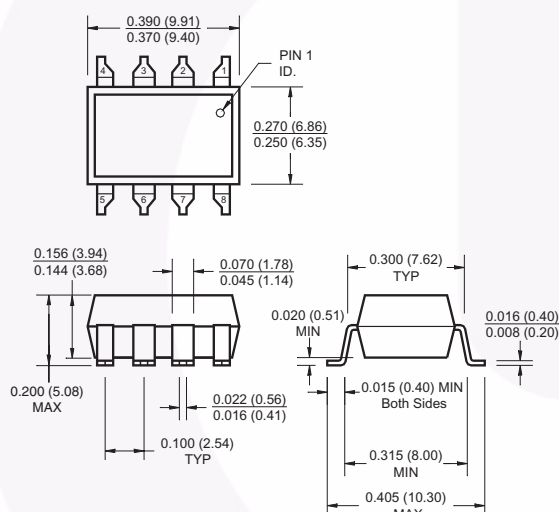
### Through Hole



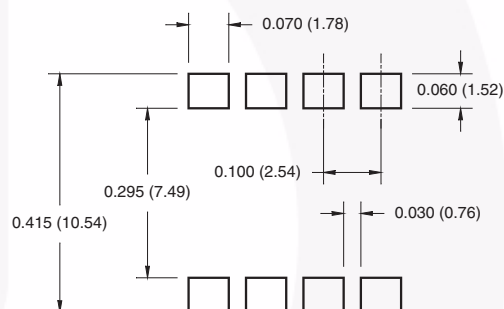
### 0.4" Lead Spacing (Option T)



### Surface Mount – 0.3" Lead Spacing (Option S)



### 8-Pin Surface Mount DIP – Land Pattern (Option S)



#### Note:

All dimensions are in inches (millimeters)

Package drawings are provided as a service to customers considering Fairchild components. Drawings may change in any manner without notice. Please note the revision and/or date on the drawing and contact a Fairchild Semiconductor representative to verify or obtain the most recent revision. Package specifications do not expand the terms of Fairchild's worldwide terms and conditions, specifically the warranty therein, which covers Fairchild products.

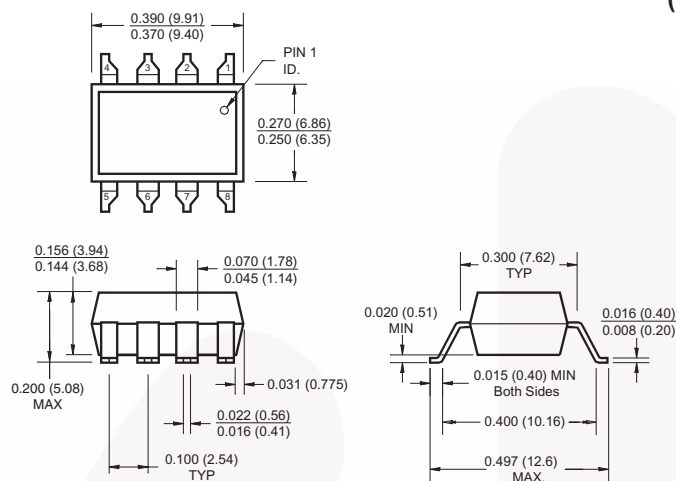
Always visit Fairchild Semiconductor's online packaging area for the most recent package drawings:

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## Package Dimensions (Continued)

### Surface Mount – 0.4" Lead Spacing (Option TS)



#### Note:

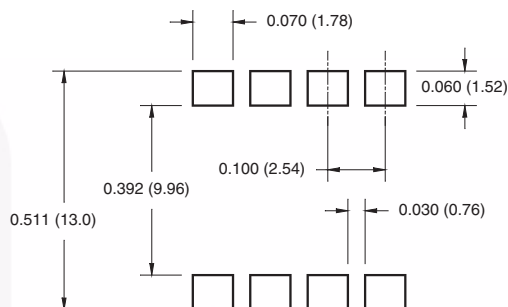
All dimensions are in inches (millimeters)

Package drawings are provided as a service to customers considering Fairchild components. Drawings may change in any manner without notice. Please note the revision and/or date on the drawing and contact a Fairchild Semiconductor representative to verify or obtain the most recent revision. Package specifications do not expand the terms of Fairchild's worldwide terms and conditions, specifically the warranty therein, which covers Fairchild products.

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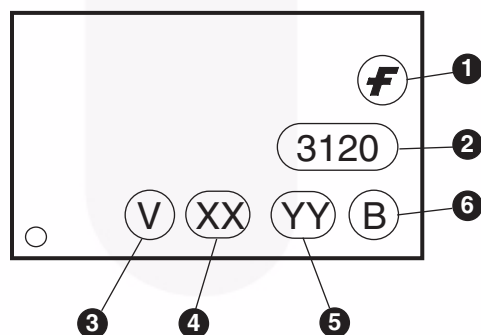
### 8-Pin Surface Mount DIP – Land Pattern (Option TS)



## Ordering Information

| Part Number  | Package                                           | Packing Method                       |
|--------------|---------------------------------------------------|--------------------------------------|
| FOD3120      | DIP 8-Pin                                         | Tube (50 units per tube)             |
| FOD3120S     | SMT 8-Pin (Lead Bend)                             | Tube (50 units per tube)             |
| FOD3120SD    | SMT 8-Pin (Lead Bend)                             | Tape and Reel (1,000 units per reel) |
| FOD3120V     | DIP 8-Pin, IEC60747-5-2 option                    | Tube (50 units per tube)             |
| FOD3120SV    | SMT 8-Pin (Lead Bend), IEC60747-5-2 option        | Tube (50 units per tube)             |
| FOD3120SDV   | SMT 8-Pin (Lead Bend), IEC60747-5-2 option        | Tape and Reel (1,000 units per reel) |
| FOD3120T     | DIP 8-Pin, 0.4" Lead Spacing                      | Tube (50 units per tube)             |
| FOD3120TV    | DIP 8-Pin, 0.4" Lead Spacing, IEC60747-5-2 option | Tube (50 units per tube)             |
| FOD3120TS    | SMT 8-Pin, 0.4" Lead Spacing                      | Tube (50 units per tube)             |
| FOD3120TSV   | SMT 8-Pin, 0.4" Lead Spacing, IEC60747-5-2 option | Tube (50 units per tube)             |
| FOD3120TSR2  | SMT 8-Pin, 0.4" Lead Spacing                      | Tape and Reel (700 units per reel)   |
| FOD3120TSR2V | SMT 8-Pin, 0.4" Lead Spacing, IEC60747-5-2 option | Tape and Reel (700 units per reel)   |

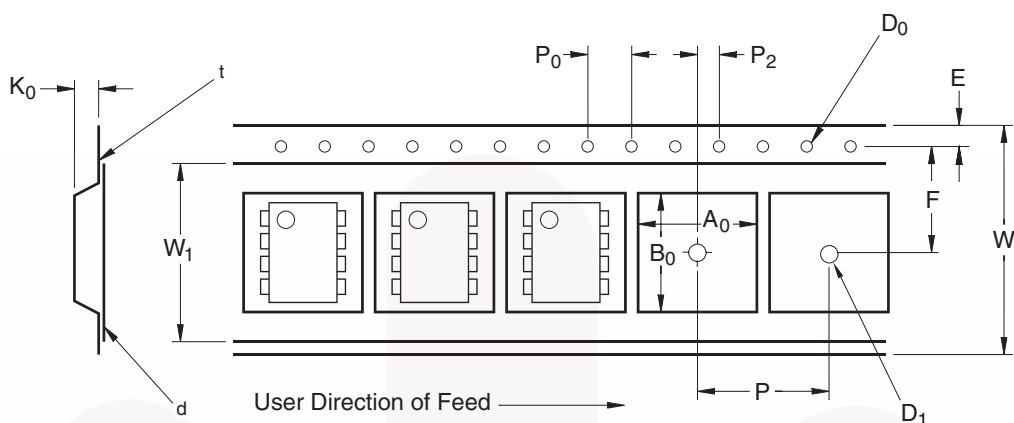
## Marking Information



### Definitions

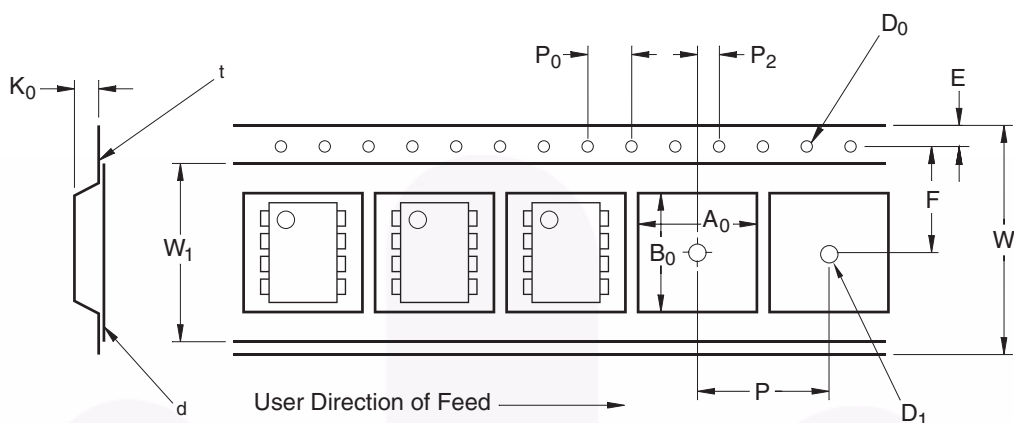
|   |                                                                                             |
|---|---------------------------------------------------------------------------------------------|
| 1 | Fairchild logo                                                                              |
| 2 | Device number                                                                               |
| 3 | IEC60747-5-2 Option (only appears on component ordered with this option) (Pending approval) |
| 4 | Two digit year code, e.g., '08'                                                             |
| 5 | Two digit work week ranging from '01' to '53'                                               |
| 6 | Assembly package code                                                                       |

## Carrier Tape Specifications (Option SD)



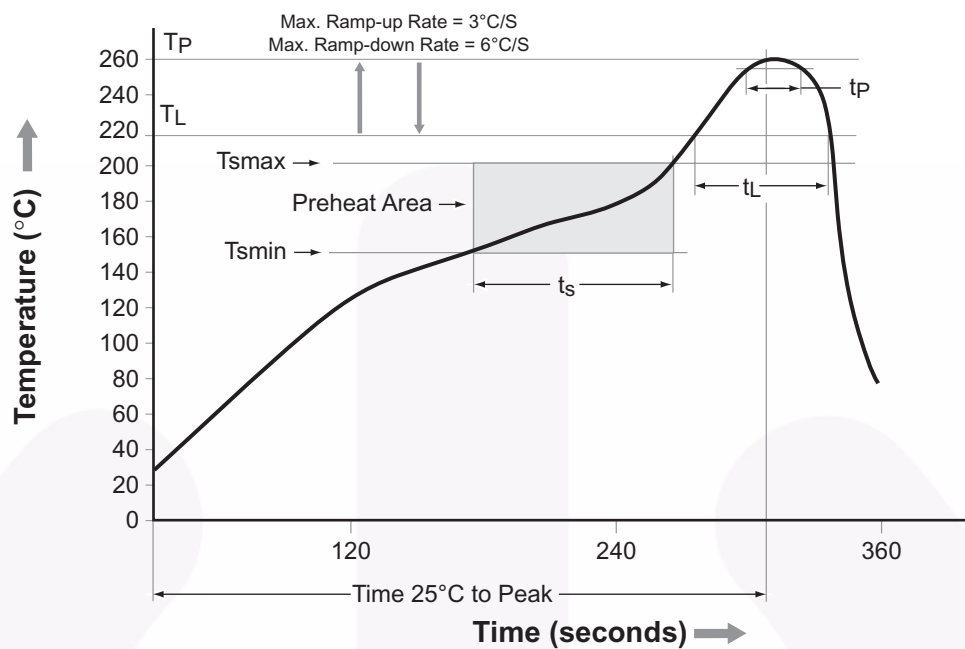
| Symbol         | Description                     | Dimension in mm  |
|----------------|---------------------------------|------------------|
| W              | Tape Width                      | $16.0 \pm 0.3$   |
| t              | Tape Thickness                  | $0.30 \pm 0.05$  |
| P <sub>0</sub> | Sprocket Hole Pitch             | $4.0 \pm 0.1$    |
| D <sub>0</sub> | Sprocket Hole Diameter          | $1.55 \pm 0.05$  |
| E              | Sprocket Hole Location          | $1.75 \pm 0.10$  |
| F              | Pocket Location                 | $7.5 \pm 0.1$    |
| P <sub>2</sub> |                                 | $2.0 \pm 0.1$    |
| P              | Pocket Pitch                    | $12.0 \pm 0.1$   |
| A <sub>0</sub> | Pocket Dimensions               | $10.30 \pm 0.20$ |
| B <sub>0</sub> |                                 | $10.30 \pm 0.20$ |
| K <sub>0</sub> |                                 | $4.90 \pm 0.20$  |
| W <sub>1</sub> | Cover Tape Width                | $13.2 \pm 0.2$   |
| d              | Cover Tape Thickness            | 0.1 max          |
|                | Max. Component Rotation or Tilt | 10°              |
| R              | Min. Bending Radius             | 30               |

## Carrier Tape Specifications (Option TSR2)



| Symbol | Description                     | Dimension in mm   |
|--------|---------------------------------|-------------------|
| $W$    | Tape Width                      | $24.0 \pm 0.3$    |
| $t$    | Tape Thickness                  | $0.40 \pm 0.1$    |
| $P_0$  | Sprocket Hole Pitch             | $4.0 \pm 0.1$     |
| $D_0$  | Sprocket Hole Diameter          | $1.55 \pm 0.05$   |
| $E$    | Sprocket Hole Location          | $1.75 \pm 0.10$   |
| $F$    | Pocket Location                 | $11.5 \pm 0.1$    |
| $P_2$  |                                 | $2.0 \pm 0.1$     |
| $P$    | Pocket Pitch                    | $16.0 \pm 0.1$    |
| $A_0$  | Pocket Dimensions               | $12.80 \pm 0.1$   |
| $B_0$  |                                 | $10.35 \pm 0.1$   |
| $K_0$  |                                 | $5.7 \pm 0.1$     |
| $W_1$  | Cover Tape Width                | $21.0 \pm 0.1$    |
| $d$    | Cover Tape Thickness            | $0.1 \text{ max}$ |
|        | Max. Component Rotation or Tilt | $10^\circ$        |
| $R$    | Min. Bending Radius             | $30$              |

## Reflow Profile

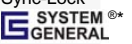


| Profile Feature                  | Pb-Free Assembly Profile |
|----------------------------------|--------------------------|
| Temperature Min. (Tsmmin)        | 150°C                    |
| Temperature Max. (Tsmax)         | 200°C                    |
| Time (ts) from (Tsmmin to Tsmax) | 60–120 seconds           |
| 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.           |



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| CTL™                                                                              | Gmax™                                                                             | Quiet Series™                                                                     | TinyLogic®                                                                          |
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| FACT Quiet Series™                                                                | MotionMax™                                                                        | SuperSOT™.3                                                                       | UHC®                                                                                |
| FACT®                                                                             | Motion-SPM™                                                                       | SuperSOT™.6                                                                       | Ultra FRFET™                                                                        |
| FAST®                                                                             | OPTOLOGIC®                                                                        | SuperSOT™.8                                                                       | UniFET™                                                                             |
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| FETBench™                                                                         |  | SyncFET™                                                                          | VisualMax™                                                                          |
| FlashWriter®*                                                                     | PDP SPM™                                                                          | Sync-Lock™                                                                        | XS™                                                                                 |
| FPS™                                                                              | Power-SPM™                                                                        |  |                                                                                     |

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Rev. I40