

**66173**

**GULL WING HERMETICALLY SEALED  
DUAL CHANNEL OPTOCOUPLER  
(Electrically Similar To 6N134)**



**OPTOELECTRONIC PRODUCTS  
DIVISION**

**Features:**

- 5 MHz bandwidth typical
- 1000 Vdc isolation test voltage
- TTL compatible input and output
- High radiation immunity
- Faraday shield to provide high common mode rejection

**Applications:**

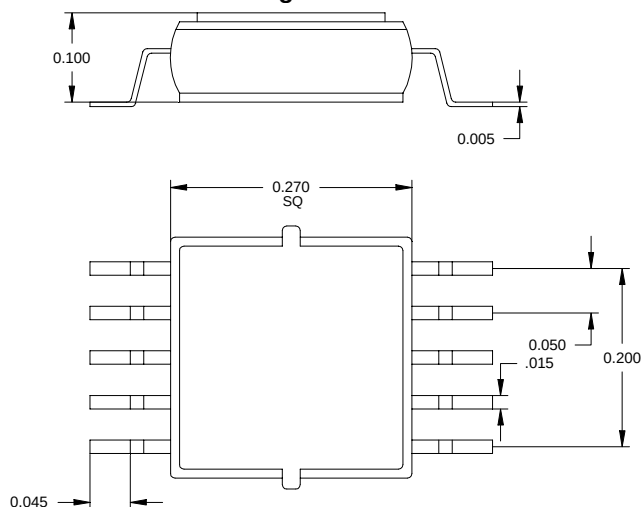
- Military and Space
- High reliability systems
- Voltage Level Shifting
- Isolated Receiver Input
- Communication systems
- Medical systems

**DESCRIPTION**

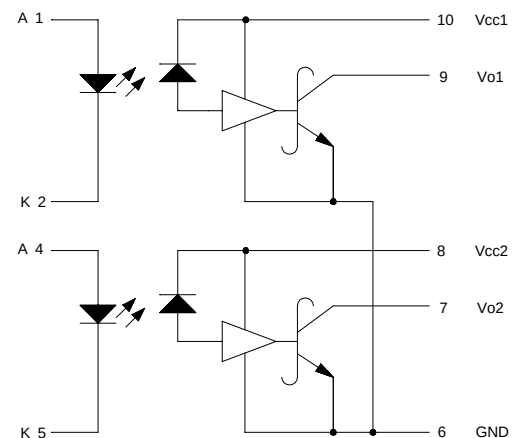
The **66173** dual channel optocoupler consists of two LEDs optically coupled to two high speed, high gain inverting detector gates. Maximum isolation can be achieved while providing TTL outputs capable of switching with propagation delays of 65ns typical. The 66173 is a 10 pin gull wing hermetically sealed package and is available in standard and screened versions or tested to customer specifications.

**ABSOLUTE MAXIMUM RATINGS**

|                                                                 |                       |
|-----------------------------------------------------------------|-----------------------|
| Storage Temperature .....                                       | -65°C to +150°C       |
| Operating Free-Air Temperature .....                            | -55°C to +125°C       |
| Lead Solder Temperature (10s, 1/16" [1.6mm] from package) ..... | 260°C                 |
| Peak Forward Input Current (each channel) .....                 | 40mA (1ms duration)   |
| Average Forward Input Current (each channel) .....              | 20mA                  |
| Input Power Dissipation (each channel) .....                    | 35mW                  |
| Reverse Input Voltage (each channel) .....                      | 5V                    |
| Supply Voltage .....                                            | 7V (1-minute maximum) |
| Output Current - $I_O$ (each channel) .....                     | 25mA                  |
| Output Power Dissipation (each channel) .....                   | 40mW                  |
| Output Voltage - $V_O$ (each channel) .....                     | 7V                    |
| Total Power Dissipation (both channels) .....                   | 350mW                 |

**Package Dimensions**

DIMENSIONS ARE IN INCHES

**Schematic Diagram**

NOTE: A. .01 TO 0.1  $\mu$ F BYPASS CAPACITOR  
MUST BE CONNECTED BETWEEN  
PINS 15 AND 10

## ELECTRICAL CHARACTERISTICS

 $T_A = -55^{\circ}\text{C}$  TO  $+125^{\circ}\text{C}$  UNLESS OTHERWISE SPECIFIED.

| PARAMETER                                   | SYMBOL    | MIN | TYP  | MAX  | UNITS         | TEST CONDITIONS                                                                                         | NOTE |
|---------------------------------------------|-----------|-----|------|------|---------------|---------------------------------------------------------------------------------------------------------|------|
| High Level Output Current                   | $I_{OH}$  |     | 5    | 250  | $\mu\text{A}$ | $V_{CC} = 5.5\text{V}$ , $V_O = 5.5\text{V}$ ,<br>$I_F = 250\mu\text{A}$                                | 1, 9 |
| Low Level Output Voltage                    | $V_{OL}$  |     | 0.35 | 0.6  | V             | $V_{CC} = 5.5\text{V}$ , $I_F = 10\text{mA}$<br>$I_{OL}$ (Sinking) = 10mA                               | 1    |
| High Level Supply Current                   | $I_{CCH}$ |     | 18   | 28   | mA            | $V_{CC} = 5.5\text{V}$ , $I_F = 0$<br>(Both Channels)                                                   |      |
| Low Level Supply Current                    | $I_{CCL}$ |     | 26   | 36   | mA            | $V_{CC} = 5.5\text{V}$ , $I_F = 20\text{mA}$<br>(Both Channels)                                         |      |
| Input Forward Voltage                       | $V_F$     |     | 1.5  | 1.75 | v             | $I_F = 20\text{mA}$                                                                                     | 1    |
| Input Reverse Breakdown Voltage             | $BV_R$    | 5   |      |      | v             | $I_R = 10\mu\text{A}$                                                                                   |      |
| Input-Output Insulation Leakage Current     | $I_{I-O}$ |     |      | 1.0  | $\mu\text{A}$ | $V_{I-O} = 1000\text{Vdc}$ ,<br>Relative Humidity = 45%<br>$T_A = 25^{\circ}\text{C}$ , $t = 5\text{s}$ | 2    |
| Propagation Delay Time To High Output Level | $t_{PLH}$ |     | 65   | 100  | ns            | $R_L = 510\Omega$ , $C_L = 15\text{pF}$<br>$I_F = 13\text{mA}$ , $T_A = 25^{\circ}\text{C}$             | 5    |
| Propagation Delay Time To Low Output Level  | $t_{PHL}$ |     | 55   | 100  | ns            | $R_L = 510\Omega$ , $C_L = 15\text{pF}$<br>$I_F = 13\text{mA}$ , $T_A = 25^{\circ}\text{C}$             | 6    |

## TYPICAL CHARACTERISTICS

 $T_A = 25^{\circ}\text{C}$ ,  $V_{CC} = 5\text{V}$  EACH CHANNEL

| PARAMETER                                           | SYMBOL                          | MIN  | TYP       | UNITS                  | TEST CONDITIONS                                                                                 | NOTE |
|-----------------------------------------------------|---------------------------------|------|-----------|------------------------|-------------------------------------------------------------------------------------------------|------|
| Input Capacitance                                   | $C_{IN}$                        |      | 60        | pF                     | $V_F = 0$ , $f = \text{MHz}$                                                                    | 1    |
| Input Diode Temperature Coefficient                 | $\frac{\Delta V_F}{\Delta T_A}$ |      | -1.9      | mV/ $^{\circ}\text{C}$ | $I_F = 20\text{mA}$                                                                             | 1    |
| Resistance (Input-Output)                           | $R_{I-O}$                       |      | $10^{12}$ | $\Omega$               | $V_{I-O} = 500\text{V}$                                                                         | 3    |
| Capacitance (Input-Output)                          | $C_{I-O}$                       |      | 1.7       | pF                     | $f = 1\text{MHz}$                                                                               | 3    |
| Input-Input Insulation Leakage Current              | $I_{I-I}$                       |      | 0.5       | nA                     | Relative Humidity = 45%<br>$V_{I-I} = 500\text{V}$ , $t = 5\text{s}$                            | 4    |
| Resistance (Input-Input)                            | $R_{I-I}$                       |      | $10^{12}$ | $\Omega$               | $V_{I-I} = 500\text{V}$                                                                         | 4    |
| Capacitance (Input-Input)                           | $C_{I-I}$                       |      | 0.80      | pF                     | $f = 1\text{Maz}$                                                                               | 4    |
| Output Rise-Fall Time (10-90%)                      | $t_r$ , $t_f$                   |      | 35        | ns                     | $R_L = 510\Omega$ , $C_L = 15\text{pF}$<br>$I_F = 13\text{mA}$                                  |      |
| Common Mode Transient Immunity at High Output Level | $CM_H$                          | 1000 | 10000     | V/ $\mu\text{s}$       | $V_{CM} = 10\text{V}$ (peak),<br>$V_O$ (min) = 2V,<br>$R_L = 510\Omega$ , $I_F = 0\text{mA}$    | 7    |
| Common Mode Transient Immunity at Low Output Level  | $CM_L$                          | 1000 | 10000     | V/ $\mu\text{s}$       | $V_{CM} = 10\text{V}$ (peak),<br>$V_O$ (max) = 0.8V,<br>$R_L = 510\Omega$ , $I_F = 10\text{mA}$ | 8    |

## NOTES:

- Each channel
- Measured between pins 1 through 8 shorted together and pins 9 through 16 shorted together.
- Measured between pins 9 and 10 or 11 and 12 shorted together, and pins 9 through 16 shorted together.
- Measured between pins 9 and 10 shorted together, and pins 11 and 12 shorted together.
- The  $t_{PLH}$  propagation delay is measured from the 6.5mA point on the trailing edge of the input pulse to the 1.5V point on the trailing edge of the output pulse.
- The  $t_{PHL}$  propagation delay is measured from the 6.5mA point on the leading edge of the input pulse to the 1.5V point on the leading edge of the output pulse.
- $CM_H$  is the max. tolerable common mode transient to assure that the output will remain in a high logic state (i.e.  $V_O > 2.0\text{V}$ ).
- $CM_L$  is the max. tolerable common mode transient to assure that the output will remain in a low logic state (i.e.  $V_O < 0.8\text{V}$ ).
- It is essential that a bypass capacitor (.01 to 0.1 $\mu\text{F}$  ceramic) be connected from pin 1 to pin 4.

## RECOMMENDED OPERATING CONDITIONS

| PARAMETER                              | SYMBOL   | MIN  | MAX | UNITS              |
|----------------------------------------|----------|------|-----|--------------------|
| Input Current, Low Level Each Channel  | $I_{FL}$ | 0    | 100 | $\mu\text{A}$      |
| Input Current, High Level Each Channel | $I_{FH}$ | 12.5 | 20  | mA                 |
| Supply Voltage                         | $V_C$    | 4.5  | 5.5 | V                  |
| Fan Out (TTL Load) Each Channel        | N        |      | 6   |                    |
| Operating Temperature                  | $T_A$    | -55  | 125 | $^{\circ}\text{C}$ |

## SELECTION GUIDE

| PART NUMBER | PART DESCRIPTION                                                                      |
|-------------|---------------------------------------------------------------------------------------|
| 66173-000   | Single Channel optocoupler, full mil-temp (-55° to +125°C) with 100% device screening |
| 66173-002   | Single Channel optocoupler, military operating range (-55° to +125°C)                 |
| 66173-003   | Single Channel optocoupler, commercial (0° to 70°C)                                   |
| 66173-004   | Single Channel optocoupler, extended temperature range (-40° to +85°C)                |