



# 6-Pin DIP Optoisolators Logic Output

The MOC5007, MOC5008 and MOC5009 have a gallium arsenide IRED optically coupled to a high-speed integrated detector with Schmitt trigger output. Ideal for applications requiring electrical isolation, fast response time, noise immunity and digital logic compatibility.

- Guaranteed Switching Times —  $t_{on}, t_{off} < 4 \mu s$
- Built-In ON/OFF Threshold Hysteresis
- High Data Rate, 1 MHz Typical (NRZ)
- Wide Supply Voltage Capability
- Microprocessor Compatible Drive
- **To order devices that are tested and marked per VDE 0884 requirements, the suffix "V" must be included at end of part number. VDE 0884 is a test option.**

### Applications

- Interfacing Computer Terminals to Peripheral Equipment
- Digital Control of Power Supplies
- Line Receiver — Eliminates Noise
- Digital Control of Motors and Other Servo Machine Applications
- Logic to Logic Isolator
- Logic Level Shifter — Couples TTL to CMOS

### MAXIMUM RATINGS ( $T_A = 25^\circ C$ unless otherwise noted)

| Rating | Symbol | Value | Unit |
|--------|--------|-------|------|
|--------|--------|-------|------|

#### INPUT LED

|  |       |      |                |
|--|-------|------|----------------|
| Reverse Voltage                            | $V_R$ | 6    | Volts          |
| Forward Current — Continuous               | $I_F$ | 60   | mA             |
| Peak                                       |       | 1.2  | Amp            |
| Pulse Width = 300 $\mu s$ , 2% Duty Cycle  |       |      |                |
| LED Power Dissipation @ $T_A = 25^\circ C$ | $P_D$ | 120  | mW             |
| Derate above $25^\circ C$                  |       | 1.41 | mW/ $^\circ C$ |

#### OUTPUT DETECTOR

|   |          |      |                |
|---|----------|------|----------------|
| Output Voltage Range                            | $V_O$    | 0–16 | Volts          |
| Supply Voltage Range                            | $V_{CC}$ | 3–16 | Volts          |
| Output Current                                  | $I_O$    | 50   | mA             |
| Detector Power Dissipation @ $T_A = 25^\circ C$ | $P_D$    | 150  | mW             |
| Derate above $25^\circ C$                       |          | 1.76 | mW/ $^\circ C$ |

#### TOTAL DEVICE

|   |           |             |                |
|---|-----------|-------------|----------------|
| Total Device Power Dissipation @ $T_A = 25^\circ C$                                   | $P_D$     | 250         | mW             |
| Derate above $25^\circ C$   |           | 2.94        | mW/ $^\circ C$ |
| Maximum Operating Temperature <sup>(2)</sup>  | $T_A$     | –40 to +85  | $^\circ C$     |
| Storage Temperature Range <sup>(2)</sup>  | $T_{stg}$ | –55 to +150 | $^\circ C$     |
| Soldering Temperature (10 s)  | $T_L$     | 260         | $^\circ C$     |
| Isolation Surge Voltage <sup>(1)</sup><br>(Peak ac Voltage, 60 Hz, 1 Second Duration) | $V_{ISO}$ | 7500        | Vac(pk)        |

1. Isolation surge voltage is an internal device dielectric breakdown rating. For this test, Pins 1 and 2 are common, and Pins 4, 5 and 6 are common.
  2. Refer to Quality and Reliability Section in Opto Data Book for information on test conditions. Preferred devices are Motorola recommended choices for future use and best overall value.
- Global Optoisolator is a trademark of Motorola, Inc.

## MOC5007\*

[IF(on) = 1.6 mA Max]

## MOC5008

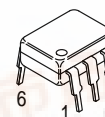
[IF(on) = 4 mA Max]

## MOC5009

[IF(on) = 10 mA Max]

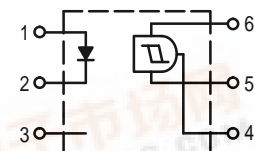
\*Motorola Preferred Device

### STYLE 5 PLASTIC



STANDARD THRU HOLE  
 CASE 730A-04

### SCHEMATIC



- PIN 1. ANODE  
 2. CATHODE  
 3. NC  
 4. OPEN COLLECTOR  
 OUTPUT  
 5. GROUND  
 6.  $V_{CC}$



# MOC5007 MOC5008 MOC5009

## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)<sup>(1)</sup>

| Characteristic   | Symbol   | Min       | Typ <sup>1)</sup> | Max      | Unit                |               |
|--|--|-----------|-------------------|----------|---------------------|---------------|
| <b>INPUT LED</b>   |  |           |                   |          |                     |               |
| Reverse Leakage Current ( $V_R = 3\text{ V}$ , $R_L = 1\text{ M}\Omega$ )                      | $I_R$  | —         | 0.05              | 10       | $\mu\text{A}$       |               |
| Forward Voltage ( $I_F = 10\text{ mA}$ )<br>( $I_F = 0.3\text{ mA}$ )                          | $V_F$  | —<br>0.75 | 1.2<br>0.95       | 1.5<br>— | Volts               |               |
| Capacitance ( $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ )  | $C$  | —         | 18                | —        | $\text{pF}$         |               |
| <b>OUTPUT DETECTOR</b>   |  |           |                   |          |                     |               |
| Operating Voltage  | $V_{CC}$   | 3         | —                 | 15       | Volts               |               |
| Supply Current ( $I_F = 0$ , $V_{CC} = 5\text{ V}$ )   | $I_{CC(\text{off})}$   | —         | 1                 | 5        | $\text{mA}$         |               |
| Output Current, High ( $I_F = 0$ , $V_{CC} = V_O = 15\text{ V}$ )                              | $I_{OH}$   | —         | —                 | 100      | $\mu\text{A}$       |               |
| <b>COUPLED</b>   |  |           |                   |          |                     |               |
| Supply Current ( $I_F = I_{F(\text{on})}$ , $V_{CC} = 5\text{ V}$ )                            | $I_{CC(\text{on})}$  | —         | 1.6               | 5        | $\text{mA}$         |               |
| Output Voltage, Low ( $R_L = 270\ \Omega$ , $V_{CC} = 5\text{ V}$ , $I_F = I_{F(\text{on})}$ ) | $V_{OL}$   | —         | 0.2               | 0.4      | Volts               |               |
| Threshold Current, ON<br>( $R_L = 270\ \Omega$ , $V_{CC} = 5\text{ V}$ )                       | $I_{F(\text{on})}$   | —         | 1.2               | 1.6      | $\text{mA}$         |               |
|  | MOC5007  | —         | —                 | 4        |                     |               |
|  | MOC5008  | —         | —                 | 10       |                     |               |
|  | MOC5009  | —         | —                 | —        |                     |               |
| Threshold Current, OFF<br>( $R_L = 270\ \Omega$ , $V_{CC} = 5\text{ V}$ )                      | $I_{F(\text{off})}$  | 0.3       | 0.75              | —        | $\text{mA}$         |               |
|  | MOC5007  | 0.3       | —                 | —        |                     |               |
|  | MOC5008, 5009  | —         | —                 | —        |                     |               |
| Hysteresis Ratio ( $R_L = 270\ \Omega$ , $V_{CC} = 5\text{ V}$ )                               | $\frac{I_{F(\text{off})}}{I_{F(\text{on})}}$   | 0.5       | 0.75              | 0.9      |                     |               |
| Isolation Voltage <sup>(2)</sup> 60 Hz, AC Peak, 1 second, $T_A = 25^\circ\text{C}$            | $V_{ISO}$  | 7500      | —                 | —        | $V_{ac(\text{pk})}$ |               |
| Turn-On Time   | $R_L = 270\ \Omega^{(3)}$<br>$V_{CC} = 5\text{ V}$ ,<br>$I_F = I_{F(\text{on})}$<br>$T_A = 25^\circ\text{C}$ | $t_{on}$  | —                 | 1.2      | 4                   | $\mu\text{s}$ |
| Fall Time  |  | $t_f$     | —                 | 0.1      | —                   |               |
| Turn-Off Time  |  | $t_{off}$ | —                 | 1.2      | 4                   |               |
| Rise Time  |  | $t_r$     | —                 | 0.1      | —                   |               |

1. Always design to the specified minimum/maximum electrical limits (where applicable).
2. For this test, IRED Pins 1 and 2 are common and Output Gate Pins 4, 5, 6 are common.
3.  $R_L$  value effect on switching time is negligible.

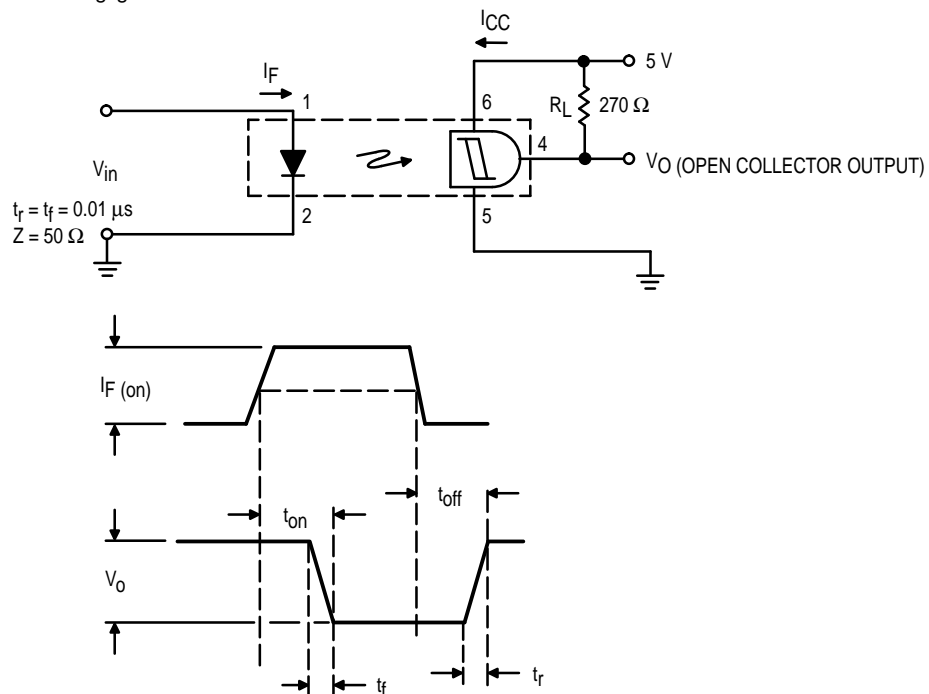


Figure 1. Switching Test Circuit

TYPICAL CHARACTERISTICS

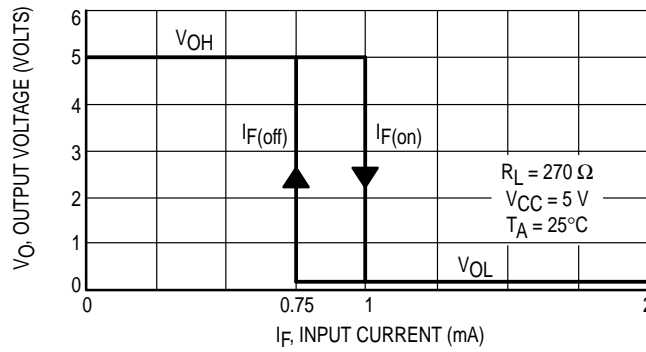


Figure 2. Transfer Characteristics for MOC5007

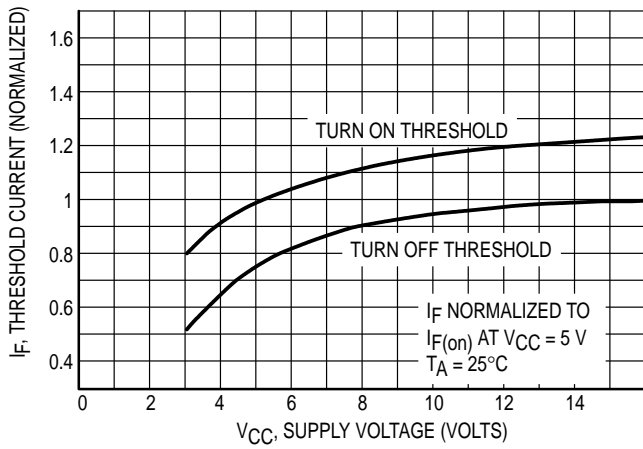


Figure 3. Threshold Current versus Supply Voltage

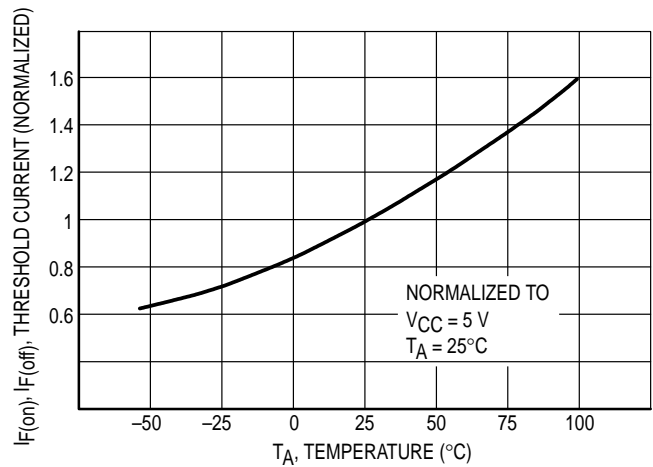


Figure 4. Threshold Current versus Temperature

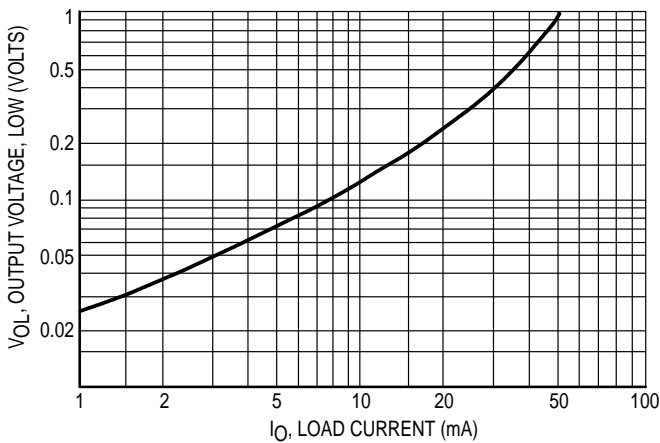


Figure 5. Output Voltage, Low versus Load Current

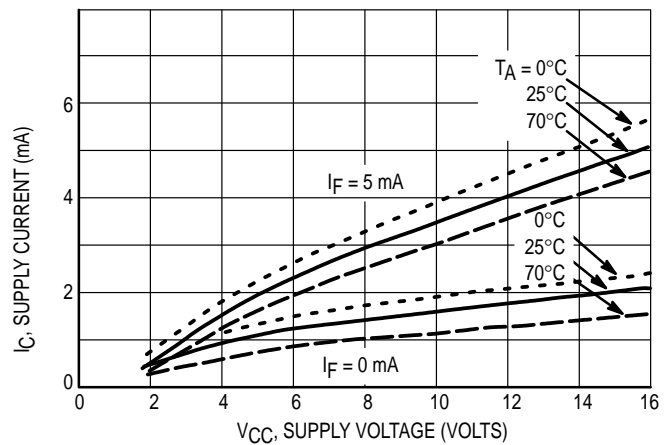
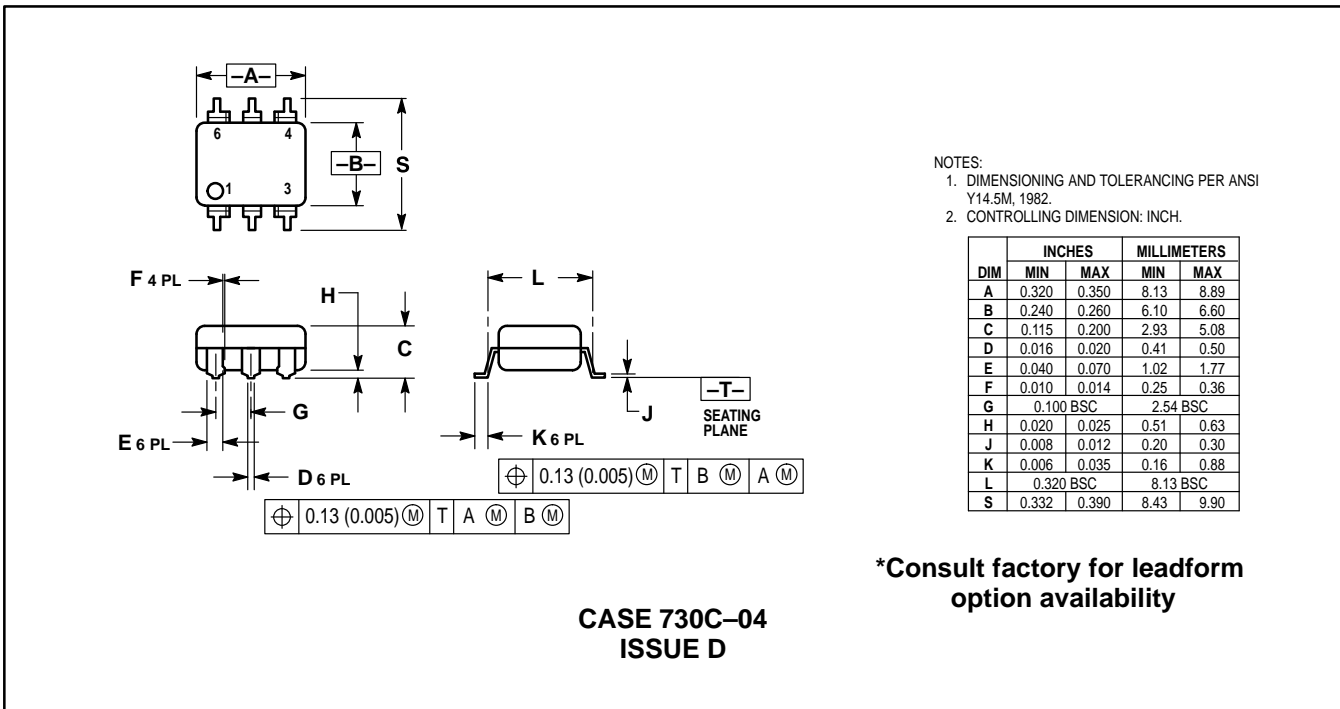
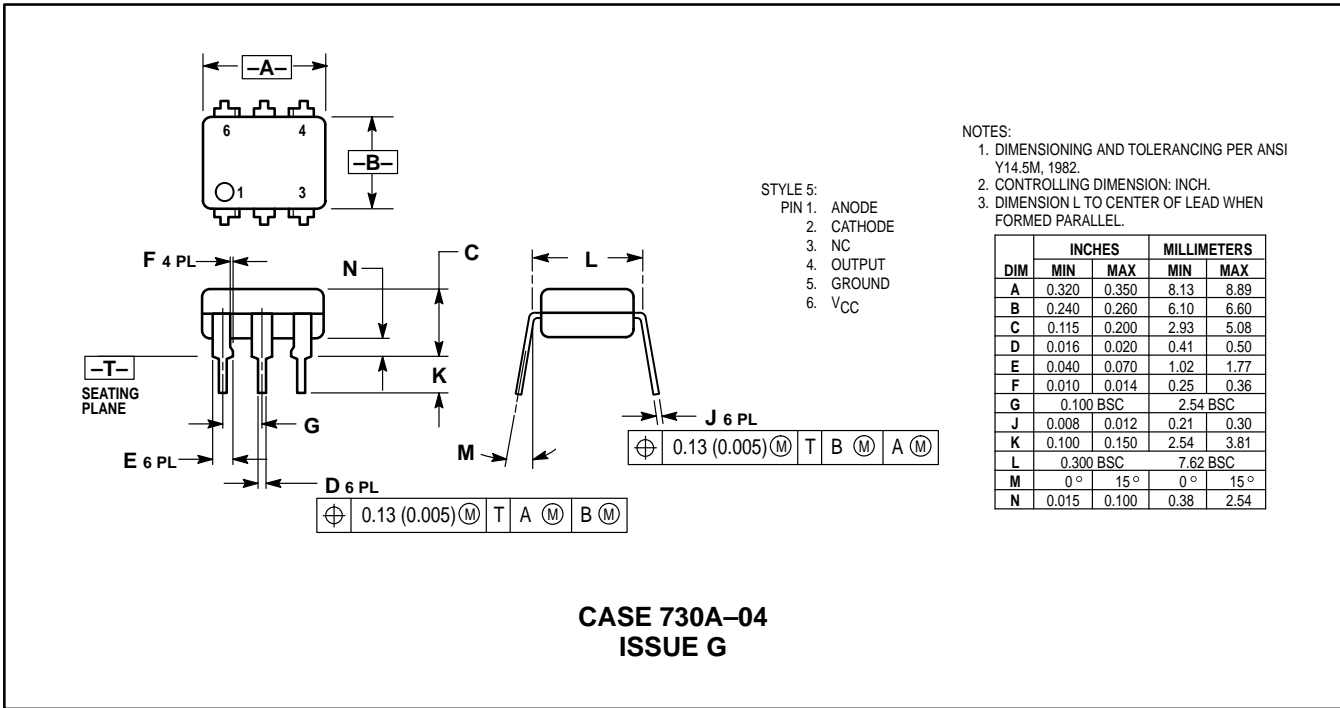


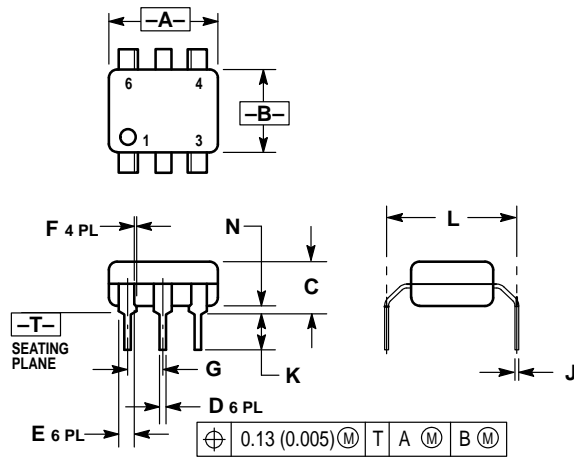
Figure 6. Supply Current versus Supply Voltage

# MOC5007 MOC5008 MOC5009

## PACKAGE DIMENSIONS



# MOC5007 MOC5008 MOC5009



**NOTES:**


1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.

| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | MIN       | MAX   | MIN         | MAX   |
| A   | 0.320     | 0.350 | 8.13        | 8.89  |
| B   | 0.240     | 0.260 | 6.10        | 6.60  |
| C   | 0.115     | 0.200 | 2.93        | 5.08  |
| D   | 0.016     | 0.020 | 0.41        | 0.50  |
| E   | 0.040     | 0.070 | 1.02        | 1.77  |
| F   | 0.010     | 0.014 | 0.25        | 0.36  |
| G   | 0.100 BSC |       | 2.54 BSC    |       |
| J   | 0.008     | 0.012 | 0.21        | 0.30  |
| K   | 0.100     | 0.150 | 2.54        | 3.81  |
| L   | 0.400     | 0.425 | 10.16       | 10.80 |
| N   | 0.015     | 0.040 | 0.38        | 1.02  |

**\*Consult factory for leadform option availability**

**CASE 730D-05  
ISSUE D**

## MOC5007 MOC5008 MOC5009

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