

## MCT9001

### DESCRIPTION

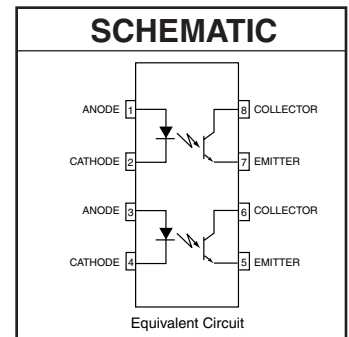
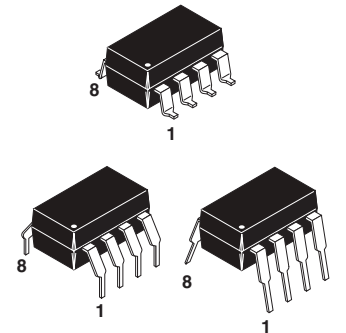
The MCT9001 Optocoupler has two channels for density applications. For four channel applications, two-packages fit into a standard 16-pin DIP socket. Each channel is an NPN silicon planar phototransistor optically coupled to a gallium arsenide infrared emitting diode.

### FEATURES

- Two isolated channels per package
- Two packages fit into a 16 lead DIP socket
- Underwriters Laboratory (U.L.) recognized File E90700

### APPLICATIONS

- AC Line/Digital Logic - isolate high voltage transients
- Digital Logic/Digital Logic - Eliminate spurious grounds
- Digital Logic/AC Triac Control - isolate high voltage transients
- Twisted pair line receiver - Eliminate ground loop feedthrough
- Telephone/Telegraph line receiver - isolate high voltage transients
- High Frequency Power Supply Feedback Control - Maintain floating grounds and transients
- Relay contact monitor - isolate floating grounds and transients
- Power supply monitor - Isolate transients



### ABSOLUTE MAXIMUM RATINGS

| Rating                                                                              | Symbol      | Value          | Unit        |
|-------------------------------------------------------------------------------------|-------------|----------------|-------------|
| <b>EMITTER</b> (Each channel)                                                       |             |                |             |
| Forward Current - Continuous                                                        | $I_F$       | 60             | mA          |
| Forward Current - Peak (PW = 1μs, 300pps)                                           | $I_{F(pk)}$ | 3              | A           |
| Reverse Voltage                                                                     | $V_R$       | 5.0            | V           |
| LED Power Dissipation @ $T_A = 25^\circ\text{C}$<br>Derate above 25°C (Total Input) | $P_D$       | 100<br>1.1     | mW<br>mW/°C |
| <b>DETECTOR</b> (Each channel)                                                      |             |                |             |
| Collector Current - Continuous                                                      | $I_C$       | 30             | mA          |
| Detector Power Dissipation @ $T_A = 25^\circ\text{C}$<br>Derate above 25°C          | $P_D$       | 150<br>1.67    | mW<br>mW/°C |
| <b>TOTAL DEVICE</b>                                                                 |             |                |             |
| Storage Temperature                                                                 | $T_{STG}$   | -55 to +150    | °C          |
| Operating Temperature                                                               | $T_{OPR}$   | -55 to +100    | °C          |
| Lead Solder Temperature                                                             | $T_{SOL}$   | 250 for 10 sec | °C          |
| Total Device Power Dissipation @ $T_A = 25^\circ\text{C}$<br>Derate above 25°C      | $P_D$       | 400<br>4.83    | mW<br>mW/°C |

**MCT9001**

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  Unless otherwise specified.)

**INDIVIDUAL COMPONENT CHARACTERISTICS**

| Parameter                           | Test Conditions                                       | Symbol     | Min | Typ** | Max | Unit          |
|-------------------------------------|-------------------------------------------------------|------------|-----|-------|-----|---------------|
| <b>EMITTER</b>                      |                                                       |            |     |       |     |               |
| Input Forward Voltage               | ( $I_F = 10\text{ mA}$ )                              | $V_F$      |     | 1.0   | 1.3 | V             |
| Reverse Current                     | ( $V_R = 5\text{ V}$ )                                | $I_R$      |     |       | 10  | $\mu\text{A}$ |
| Junction Capacitance                | ( $V_F = 0\text{ V}$ , $f = 1\text{ MHz}$ )           | $C_J$      |     | 50    |     | pF            |
| <b>DETECTOR</b>                     |                                                       |            |     |       |     |               |
| Collector-Emitter Breakdown Voltage | ( $I_C = 0.5\text{ mA}$ , $I_F = 0$ )                 | $BV_{CEO}$ | 55  |       |     | V             |
| Emitter-Collector Breakdown Voltage | ( $I_E = 100\text{ }\mu\text{A}$ , $I_F = 0$ )        | $BV_{ECO}$ | 7   |       |     | V             |
| Collector-Emitter Dark Current      | ( $V_{CE} = 24\text{ V}$ , $I_F = 0$ )                | $I_{CEO}$  |     | 5     | 100 | nA            |
|                                     | ( $V_{CE} = 24\text{ V}$ , $T_A = 85^\circ\text{C}$ ) |            |     |       | 50  | $\mu\text{A}$ |
| Capacitance                         | ( $V_{CE} = 0\text{ V}$ , $f = 1\text{ MHz}$ )        | $C_{CE}$   |     | 8     |     | pF            |

**TRANSFER CHARACTERISTICS**

| AC Characteristic      | Test Conditions                                                              | Symbol    | Min | Typ** | Max | Units         |
|------------------------|------------------------------------------------------------------------------|-----------|-----|-------|-----|---------------|
| <b>SWITCHING TIMES</b> |                                                                              |           |     |       |     |               |
| Non-Saturated          | $(R_L = 100\text{ }\Omega$ , $I_C = 2\text{ mA}$ , $V_{CC} = 10\text{ V}$ )  |           |     |       |     | $\mu\text{s}$ |
| Turn-on Time           |                                                                              | $t_{on}$  |     | 3     |     |               |
| Turn-off Time          |                                                                              | $t_{off}$ |     | 3     |     |               |
| Rise Time              |                                                                              | $t_r$     |     | 2.4   |     |               |
| Fall Time              |                                                                              | $t_f$     |     | 2.4   |     |               |
| Saturated              | $(I_F = 16\text{ mA}$ , $R_L = 1.9\text{ k}\Omega$ , $V_{CE} = 5\text{ V}$ ) |           |     |       |     |               |
| Turn-on Time           |                                                                              | $t_{on}$  |     | 2.4   |     |               |
| Turn-off Time          |                                                                              | $t_{off}$ |     | 25.0  |     |               |

**TRANSFER CHARACTERISTICS**

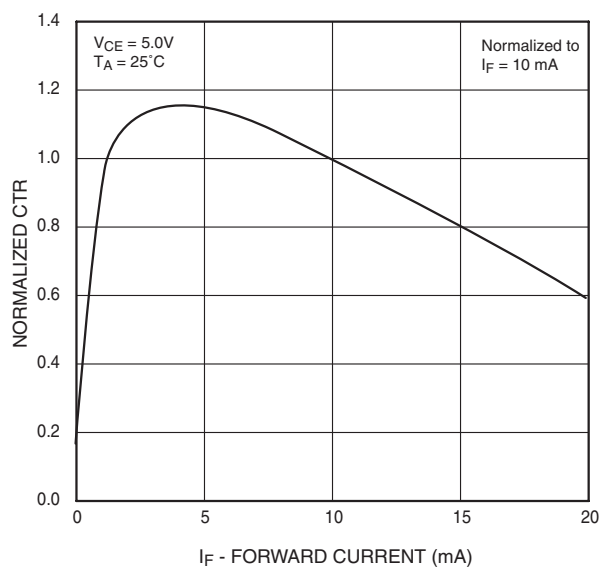
| DC Characteristic                         | Test Conditions                                   | Symbol        | Min | Typ** | Max  | Units |
|-------------------------------------------|---------------------------------------------------|---------------|-----|-------|------|-------|
| Current Transfer Ratio, Collector-Emitter | ( $I_F = 5\text{ mA}$ , $V_{CE} = 5\text{ V}$ )   | CTR           | 50  |       | 600  | %     |
|                                           | ( $I_F = 8\text{ mA}$ , $V_{CE} = 0.4\text{ V}$ ) | $CTR_{(sat)}$ | 30  |       |      |       |
| Saturation Voltage                        | ( $I_F = 8\text{ mA}$ , $I_C = 2.4\text{ mA}$ )   | $V_{CE(sat)}$ |     |       | 0.40 | V     |

**ISOLATION CHARACTERISTICS**

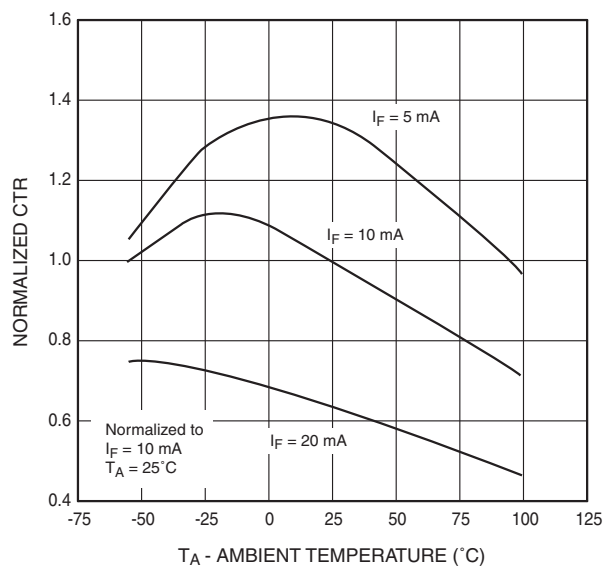
| Characteristic                 | Test Conditions                                               | Symbol    | Min       | Typ** | Max | Units    |
|--------------------------------|---------------------------------------------------------------|-----------|-----------|-------|-----|----------|
| Input-Output Isolation Voltage | ( $I_{I-O} \leq 1\text{ }\mu\text{A}$ , $t = 1\text{ min.}$ ) | $V_{ISO}$ | 5300      |       |     | Vac(rms) |
| Isolation Resistance           | ( $V_{I-O} = 500\text{ VDC}$ )                                | $R_{ISO}$ | $10^{11}$ |       |     | $\Omega$ |
| Isolation Capacitance          | ( $f = 1\text{ MHz}$ )                                        | $C_{ISO}$ |           | 0.5   |     | pf       |

\*\* All typicals at  $T_A = 25^\circ\text{C}$

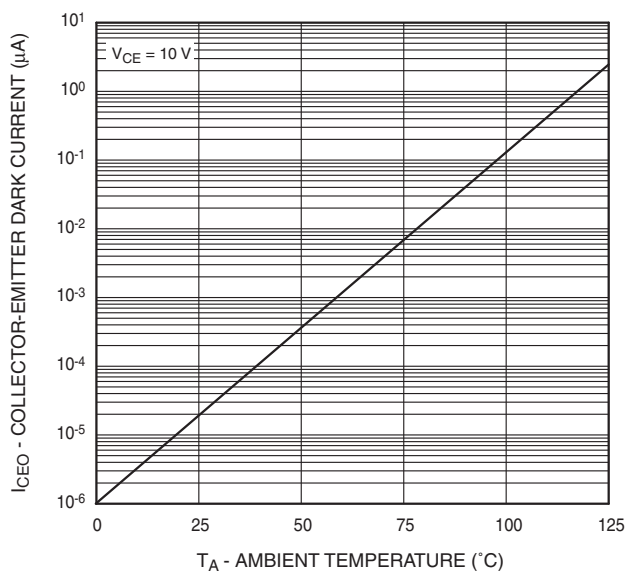
**Normalized CTR vs. Forward Current**



**Normalized CTR vs. Ambient Temperature**

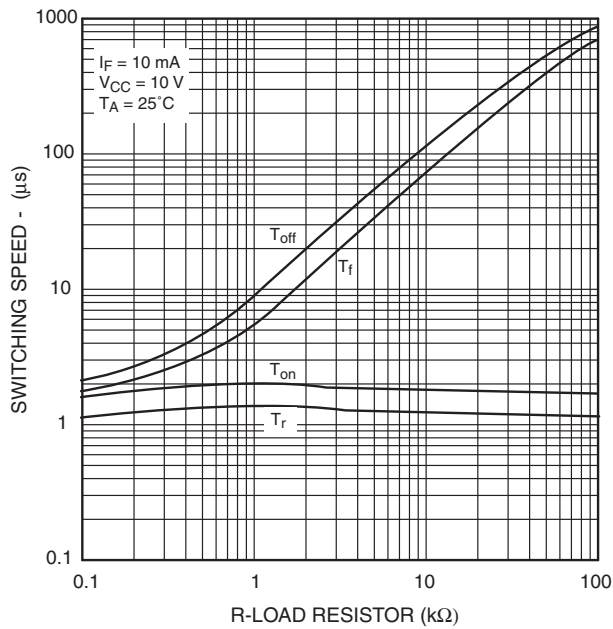


**Dark Current vs. Ambient Temperature**

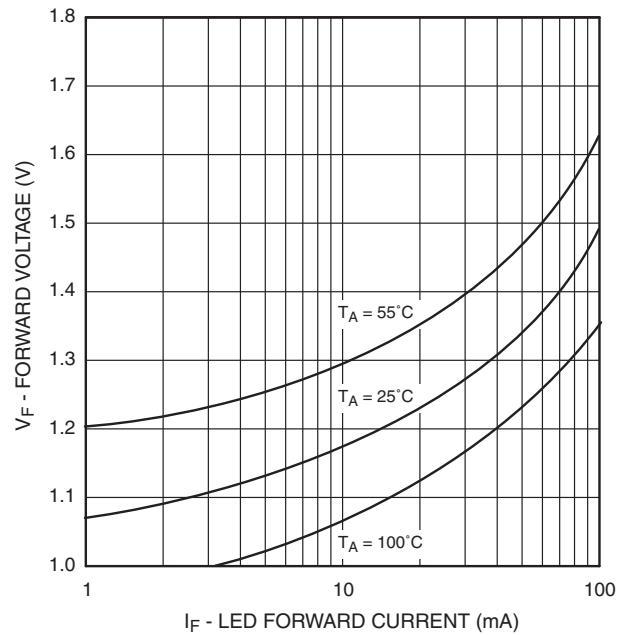


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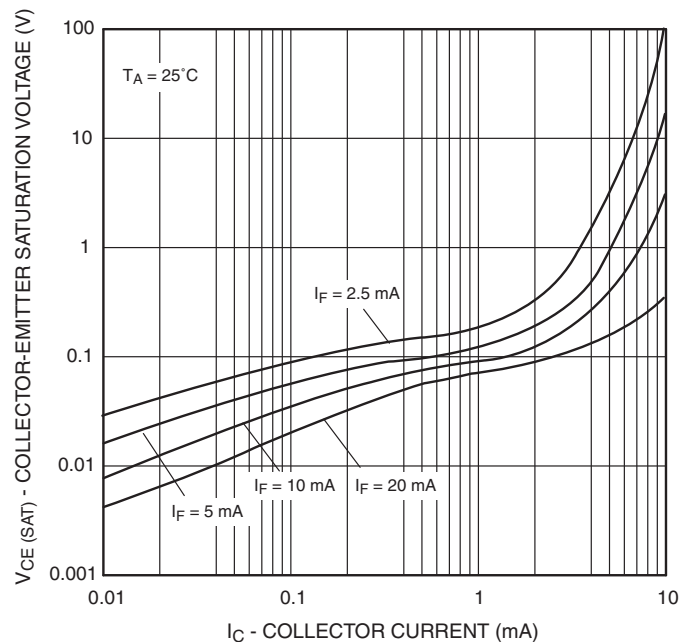
**Switching Speed vs. Load Resistor**



**LED Forward Voltage vs. Forward Current**

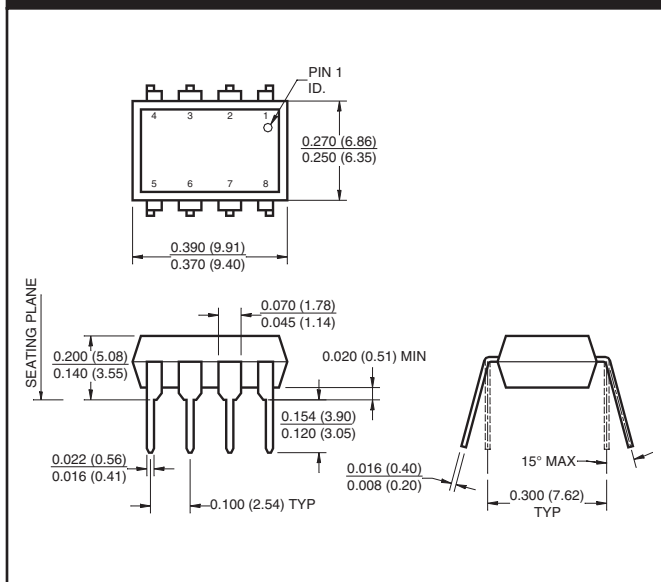


**Collector-Emitter Saturation Voltage vs Collector Current**

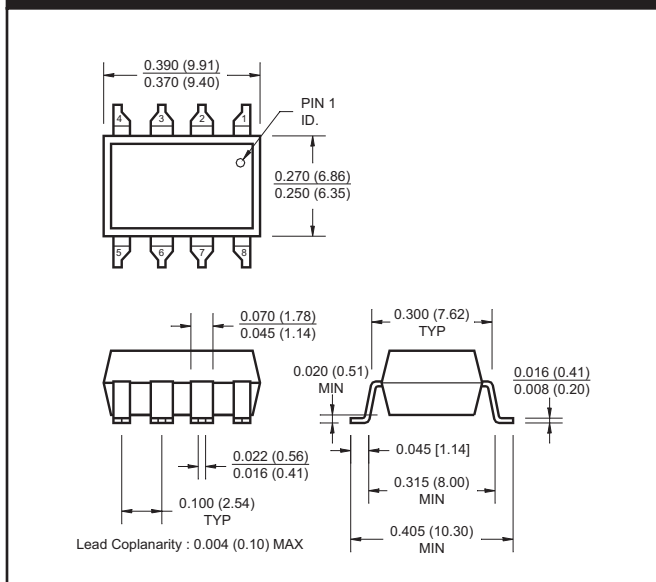


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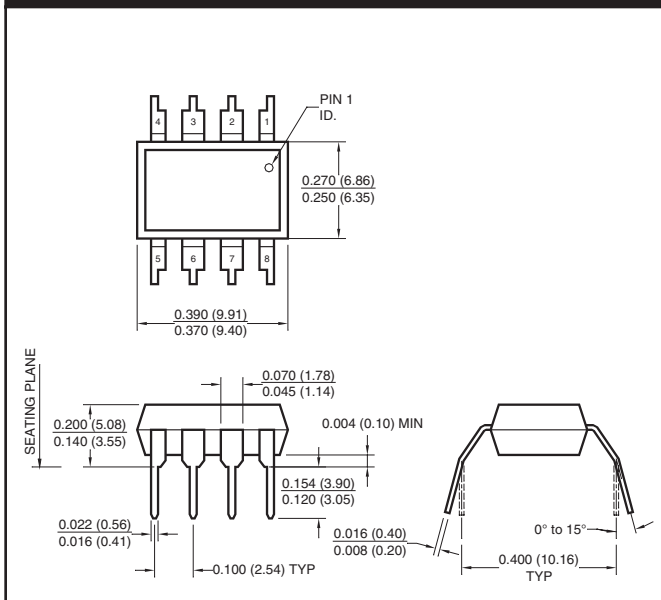
**Package Dimensions (Through Hole)**



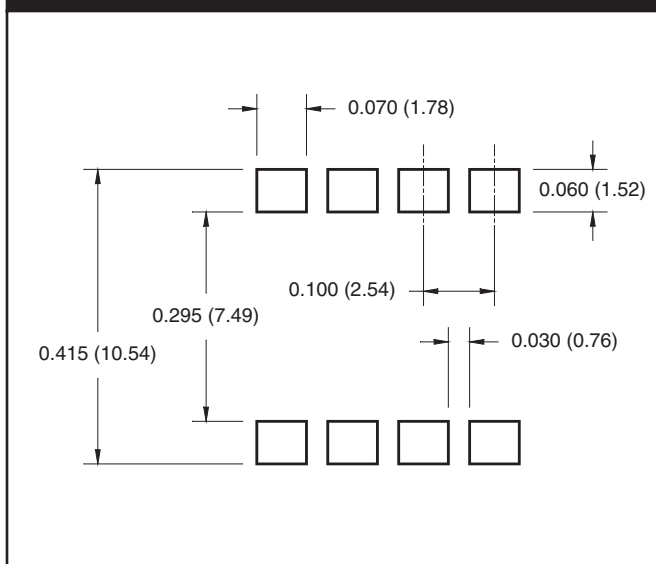
**Package Dimensions (Surface Mount)**



**Package Dimensions (0.4" Lead Spacing)**



**Recommended Pad Layout for  
Surface Mount Leadform**



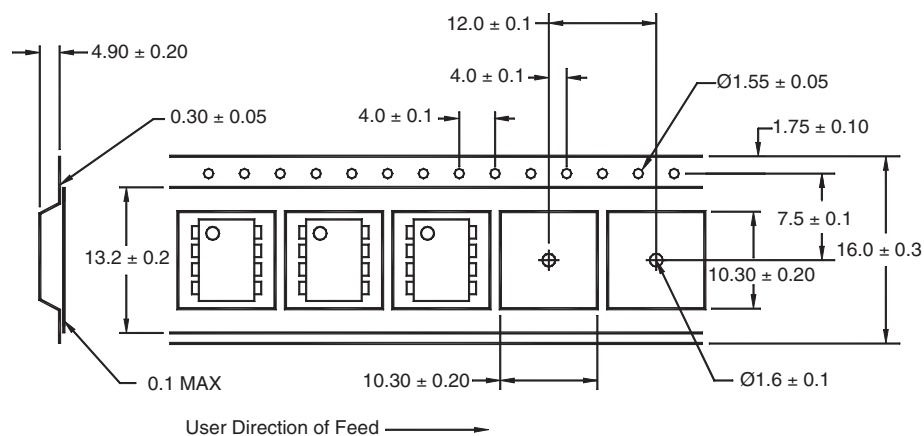
**NOTE**

All dimensions are in inches (millimeters)

## ORDERING INFORMATION

| Option | Order Entry Identifier | Description                  |
|--------|------------------------|------------------------------|
| S      | .S                     | Surface Mount Lead Bend      |
| SD     | .SD                    | Surface Mount; Tape and reel |
| W      | .W                     | 0.4" Lead Spacing            |

## Carrier Tape Specifications



## NOTE

All dimensions are in inches (millimeters)

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