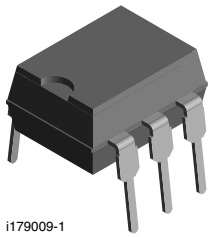
## Optocoupler, Phototransistor Output, no Base Connection



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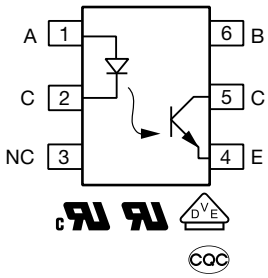



### FEATURES

- Isolation test voltage, 5300 $V_{RMS}$
- No base terminal connection for improved common mode interface immunity
- Long term stability
- Industry standard dual in line package
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

### LINKS TO ADDITIONAL RESOURCES

3D Models | Design Tools | Related Documents | SPICE Models | Footprints | Schematics

### AGENCY APPROVALS

- UL
- cUL
- DIN EN 60747-5-5 (VDE 0884), available with option 1
- BSI EN 62368-1
- CQC GB4943.1-2011
- CQC GB8898-2011

### DESCRIPTION

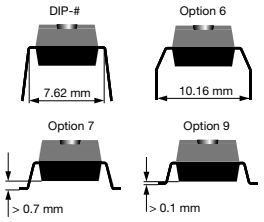
The MOC8101, MOC8102, MOC8103, MOC8104 family optocoupler consisting of a gallium arsenide infrared emitting diode optically coupled to a silicon planar phototransistor detector in a plastic plug-in DIP-6 package.

The coupling device is suitable for signal transmission between two electrically separated circuits. The potential difference between the circuits to be coupled should not exceed the maximum permissible reference voltages.

The base terminal of the MOC8101, MOC8102, MOC8103, MOC8104 is not connected, resulting in a substantially improved common mode interference immunity.

### ORDERING INFORMATION

| M | O | C | 8 | 1 | 0 | # | - | # | X | 0 | # | # | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PART NUMBER | | | | | | | | CTR BIN | PACKAGE OPTION | | | | TAPE AND REEL |




| AGENCY CERTIFIED / PACKAGE | CTR (%) | | | |
|---|---|---|---|---|
| | 10 mA | | | |
| **UL, cUL, BSI, CQC** | **50 to 80** | **73 to 117** | **108 to 173** | **160 to 256** |
| DIP-6 | MOC8101 | MOC8102 | MOC8103 | MOC8104 |
| DIP-6, 400 mil, option 6 | - | MOC8102-X006 | - | - |
| SMD-6, option 9 | - | MOC8102-X009 (1) | - | - |
| **UL, cUL, BSI, CQC, VDE (Option 1)** | **50 to 80** | **73 to 117** | **108 to 173** | **160 to 256** |
| DIP-6 | - | - | MOC8103-X001 | - |
| DIP-6, 400 mil | - | MOC8102-X016 | - | MOC8104-X016 |
| SMD-6, option 7 | MOC8101-X017T | MOC8102-X017T (1) | - | - |
| SMD-6, option 9 | - | - | - | MOC8104-X019T |

**Notes**

- Additional options may be possible, please contact sales office

(1) Also available in tubes; do not put T on end

| **ABSOLUTE MAXIMUM RATINGS** ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | |
|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **VALUE** | **UNIT** |
| **INPUT** | | | | |
| Reverse voltage | | $V_R$ | 6.0 | V |
| Forward continuous current | | $I_F$ | 60 | mA |
| Surge forward current | t ≤ 10 µs | $I_{FSM}$ | 2.5 | A |
| Power dissipation | | $P_{diss}$ | 100 | mW |
| Derate linearly from 25°C | | | 1.33 | mW/°C |
| **OUTPUT** | | | | |
| Collector emitter breakdown voltage | | $BV_{CEO}$ | 30 | V |
| Emitter collector breakdown voltage | | $BV_{ECO}$ | 7.0 | V |
| Collector current | | $I_C$ | 50 | mA |
| Derate linearly from 25°C | | | 2.0 | mW/°C |
| Power dissipation | | $P_{diss}$ | 150 | mW |
| **COUPLER** | | | | |
| Derate linearly from 25 °C | | | 3.33 | mW/°C |
| Total power dissipation | | $P_{tot}$ | 250 | mW |
| Storage temperature | | $T_{stg}$ | -55 to +150 | °C |
| Operating temperature | | $T_{amb}$ | -55 to +100 | °C |
| Junction temperature | | $T_j$ | 100 | °C |
| Soldering temperature (1) | max. 10 s, dip soldering: distance to seating plane ≥ 1.5 mm | $T_{sld}$ | 260 | °C |

**Notes**

- Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute maximum ratings for extended periods of the time can adversely affect reliability

(1) Refer to reflow profile for soldering conditions for surface mounted devices (SMD). Refer to wave profile for soldering conditions for through hole devices (DIP)

| **ELECTRICAL CHARACTERISTICS** ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **PART** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| **INPUT** | | | | | | | |
| Forward voltage | $I_F$ = 10 mA | | $V_F$ | - | 1.25 | 1.5 | V |
| Breakdown voltage | $I_R$ = 10 µA | | $V_{BR}$ | 6.0 | - | - | V |
| Reverse current | $V_R$ = 6.0 V | | $I_R$ | - | 0.01 | 10 | µA |
| Capacitance | $V_R$ = 0 V, f = 1.0 MHz | | $C_O$ | - | 25 | - | pF |
| Thermal resistance | | | $R_{thja}$ | - | 750 | - | K/W |
| **OUTPUT** | | | | | | | |
| Collector emitter capacitance | $V_{CE}$ = 5.0 V, f = 1.0 MHz | | $C_{CE}$ | - | 5.2 | - | pF |
| Collector emitter dark current | $V_{CE}$ = 10 V, $T_{amp}$ = 25 °C | MOC8101 | $I_{CEO1}$ | - | 1.0 | 50 | nA |
| | $V_{CE}$ = 10 V, $T_{amp}$ = 100 °C | MOC8102 | $I_{CEO1}$ | - | 1.0 | - | µA |
| Collector emitter breakdown voltage | $I_C$ = 1.0 mA | | $BV_{CEO}$ | 30 | - | - | V |
| Emitter collector breakdown voltage | $I_E$ = 100 µA | | $BV_{ECO}$ | 7.0 | - | - | V |
| Thermal resistance | | | $R_{thja}$ | - | 500 | - | K/W |
| **COUPLER** | | | | | | | |
| Saturation voltage collector emitter | $I_F$ = 5.0 mA | | $V_{CEsat}$ | - | 0.25 | 0.4 | V |
| Coupling capacitance | | | $C_C$ | - | 0.6 | - | pF |

**Note**

- Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluation. Typical values are for information only and are not part of the testing requirements

| **CURRENT TRANSFER RATIO** ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **PART** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| Current transfer ratio | $V_{CE}$ = 10 V, $I_F$ = 10 mA | MOC8101 | CTR | 50 | - | 80 | % |
| | | MOC8102 | CTR | 73 | - | 117 | % |
| | | MOC8103 | CTR | 108 | - | 173 | % |
| | | MOC8104 | CTR | 160 | - | 256 | % |

| **SWITCHING CHARACTERISTICS** ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| Turn-on time | $V_{CC}$ = 10 V, $I_C$ = 2.0 mA, $R_L$ = 100 Ω | $t_{on}$ | - | 3.0 | - | µs |
| Turn-off time | $V_{CC}$ = 10 V, $I_C$ = 2.0 mA, $R_L$ = 100 Ω | $t_{off}$ | - | 2.3 | - | µs |
| Rise time | $V_{CC}$ = 10 V, $I_C$ = 2.0 mA, $R_L$ = 100 Ω | $t_r$ | - | 2.0 | - | µs |
| Fall time | $V_{CC}$ = 10 V, $I_C$ = 2.0 mA, $R_L$ = 100 Ω | $t_f$ | - | 2.0 | - | µs |
| Cut off frequency | | $f_{co}$ | - | 250 | - | kHz |

| **SAFETY AND INSULATION RATINGS** | | | | |
|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **VALUE** | **UNIT** |
| Climatic classification | According to IEC 68 part 1 | | 55 / 100 / 21 | |
| Comparative tracking index | | CTI | 175 | |
| Maximum rated withstanding isolation voltage | t = 1 min | $V_{ISO}$ | 4420 | $V_{RMS}$ |
| Maximum transient isolation voltage | | $V_{IOTM}$ | 10 000 | V |
| Maximum repetitive peak isolation voltage | | $V_{IORM}$ | 890 | V |
| Isolation resistance | $V_{IO}$ = 500 V, $T_{amb}$ = 25 °C | $R_{IO}$ | ≥ $10^{12}$ | Ω |
| | $V_{IO}$ = 500 V, $T_{amb}$ = 100 °C | $R_{IO}$ | ≥ $10^{11}$ | Ω |
| Output safety power | | $P_{SO}$ | 400 | mW |
| Input safety current | | $I_{SI}$ | 275 | mA |
| Input safety temperature | | $T_{SI}$ | 175 | °C |
| Creepage distance | Standard DIP-6 | | ≥ 7 | mm |
| Clearance distance | Standard DIP-6 | | ≥ 7 | mm |
| Creepage distance | 400 mil DIP-6 | | ≥ 8 | mm |
| Clearance distance | 400 mil DIP-6 | | ≥ 8 | mm |
| Insulation thickness | | DTI | ≥ 0.4 | mm |

**Note**

- As per IEC 60747-5-5, § 7.4.3.8.2, this optocoupler is suitable for “safe electrical insulation” only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits

**TYPICAL CHARACTERISTICS** ($T_{amb}$ = 25 °C, unless otherwise specified)

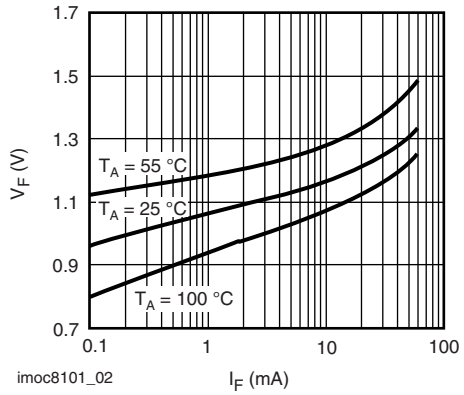



Fig. 1 - Forward Voltage vs. Forward Current

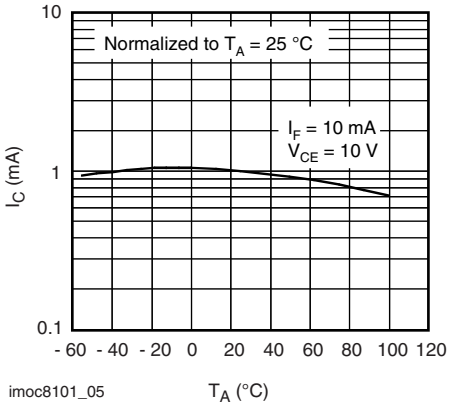



Fig. 4 - Collector Current vs. Ambient Temperature

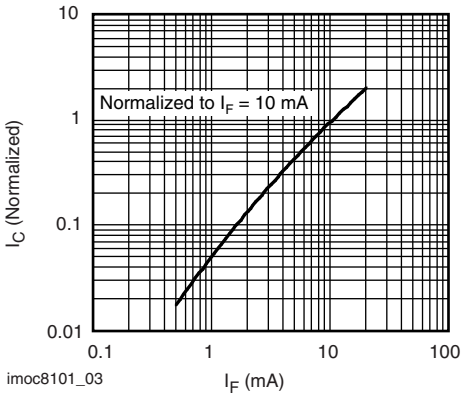



Fig. 2 - Collector Current vs. LED Forward Current

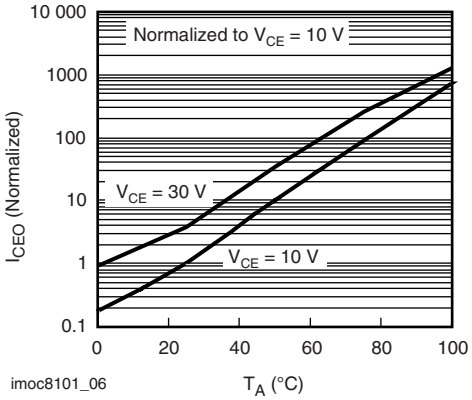



Fig. 5 - Collector Emitter Dark Current vs. Ambient Temperature

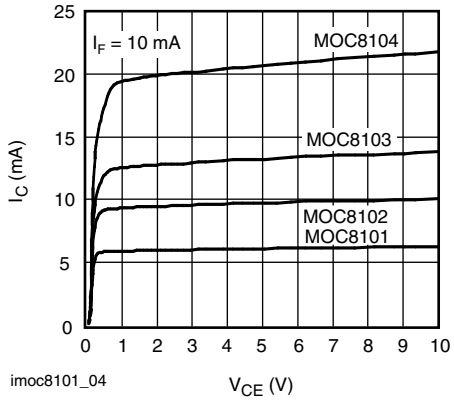



Fig. 3 - Collector Current vs. Collector Emitter Voltage

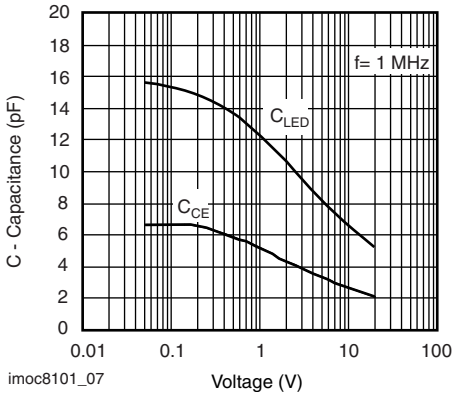



Fig. 6 - Capacitance vs. Voltage

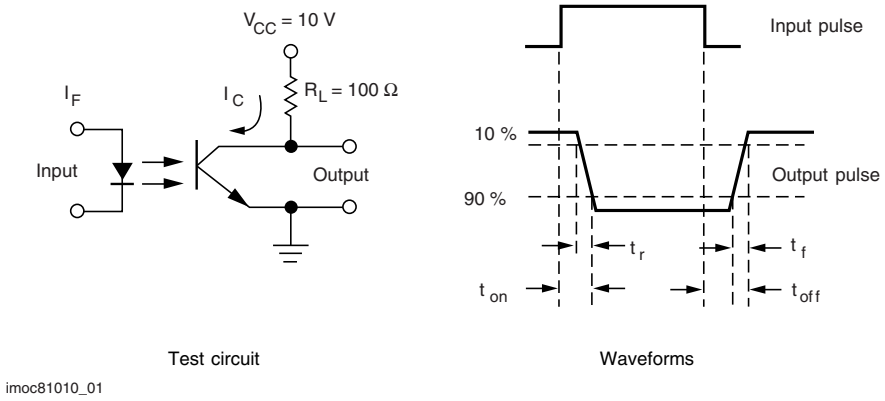
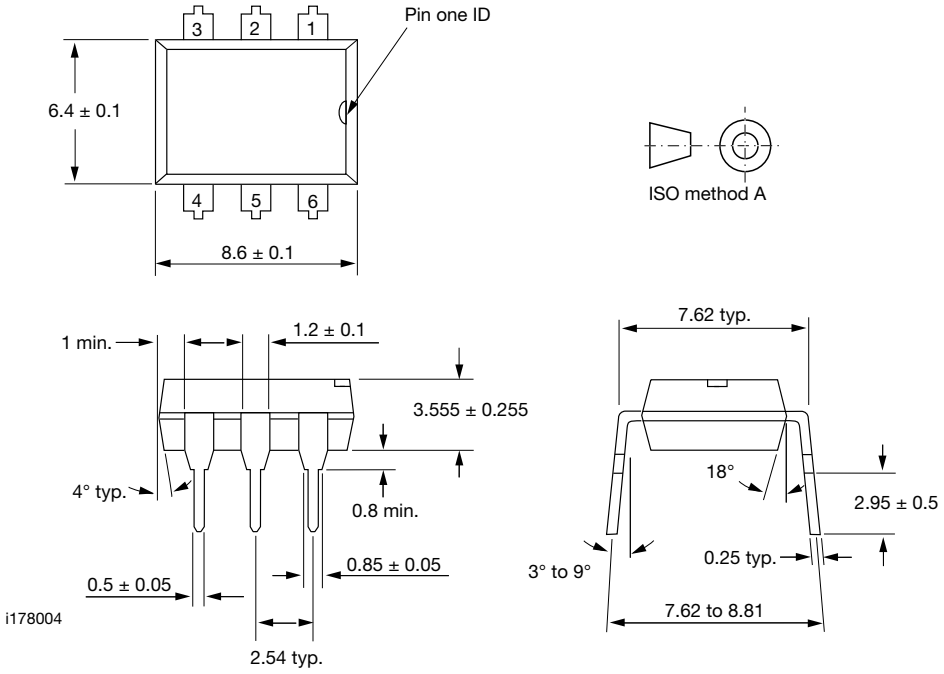
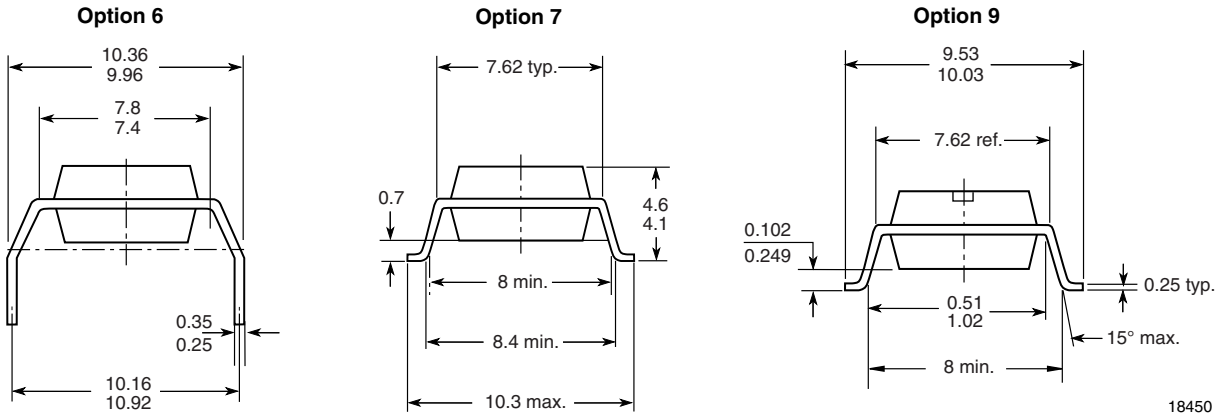



Fig. 7 - Switching Time Test Circuit and Waveforms

## **PACKAGE DIMENSIONS** in millimeters



**PACKAGE MARKING** (example)

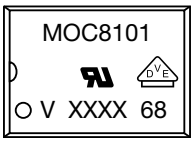



Fig. 8 - Example of MOC8101-X017T

**Notes**

- XXXX = LMC (lot marking code)
- VDE logo is only marked on option 1 parts
- Tape and reel suffix (T) is not part of the package marking

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