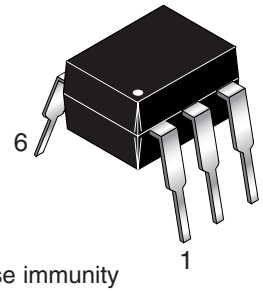
FAIRCHILD
SEMICONDUCTOR™

# PHOTODARLINGTON OPTOCOUPLERS (NO BASE CONNECTION)

**MOC119**

## DESCRIPTION

The MOC119 device has a gallium arsenide infrared emitting diode coupled to a silicon darlington phototransistor.

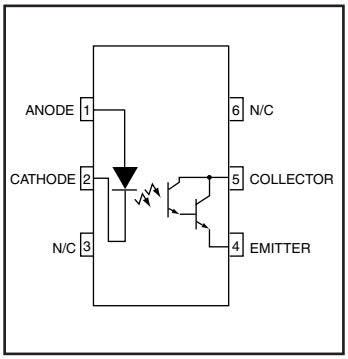



## FEATURES

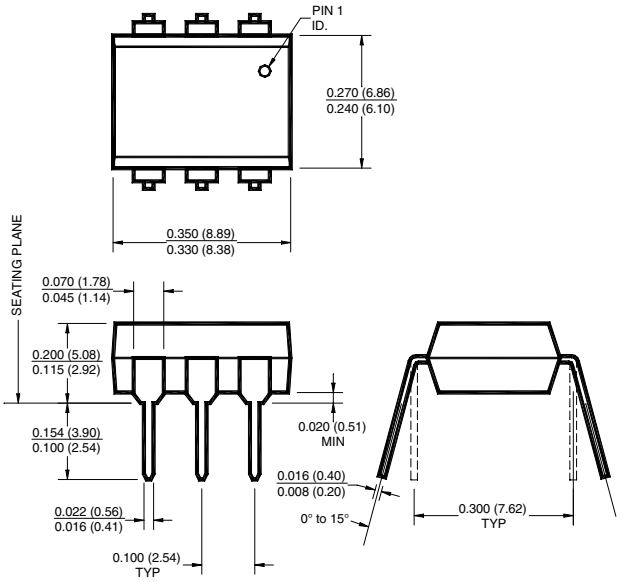
- High current transfer ratio of 300%
- No base connection for improved noise immunity
- Underwriters Laboratory (UL) recognized File# E90700

## APPLICATIONS

- Appliances, measuring instruments
- I/O interface for computers
- Programmable controllers
- Portable electronics
- Interfacing and coupling systems of different potentials and impedance
- Solid state relays




## PACKAGE DIMENSIONS




**NOTE**
All dimensions are in inches (millimeters)

## ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25°C Unless otherwise specified.)

| Parameter | Symbol | Value | Units |
|---|---|---|---|
| **TOTAL DEVICE** Storage Temperature | $T_{STG}$ | -55 to +150 | °C |
| Operating Temperature | $T_{OPR}$ | -55 to +100 | °C |
| Lead Solder Temperature | $T_{SOL}$ | 260 for 10 sec | °C |
| Total Device Power Dissipation @ $T_A$ = 25°C | $P_D$ | 250 | mW |
| Derate above 25°C | | 2.94 | mW/°C |
| Input-Output Isolation Voltage | $V_{ISO}$ | 5300 | Vac(rms) |
| **EMITTER** DC/Average Forward Input Current | $I_F$ | 60 | mA |
| Reverse Input Voltage | $V_R$ | 3 | V |
| LED Power Dissipation @ $T_A$ = 25°C | $P_D$ | 120 | mW |
| Derate above 25°C | | 1.41 | mW/°C |
| **DETECTOR** Collector-Emitter Voltage | $V_{CEO}$ | 30 | V |
| Emitter-Collector Voltage | $V_{ECO}$ | 7 | V |
| Detector Power Dissipation @ $T_A$ = 25°C | $P_D$ | 150 | mW |
| Derate above 25°C | | 1.76 | mW/°C |
| Continuous Collector Current | $I_C$ | 150 | mA |

## ELECTRICAL CHARACTERISTICS ($T_A$ = 25°C Unless otherwise specified.)

### INDIVIDUAL COMPONENT CHARACTERISTICS

| Parameter | Test Conditions | Symbol | Min | Typ** | Max | Unit |
|---|---|---|---|---|---|---|
| **EMITTER** | | | | | | |
| Input Forward Voltage | ($I_F$ = 10 mA) | $V_F$ | | 1.15 | 1.5 | V |
| Input Capacitance | ($V_R$ = 0, f = 1 MHz) | $C_{IN}$ | | 18 | | pF |
| Reverse Leakage Current | ($V_R$ = 3.0 V) | $I_R$ | | 0.05 | 100 | µA |
| **DETECTOR** | | | | | | |
| Collector-Emitter Breakdown Voltage | ($I_C$ = 100 µA) | $BV_{CEO}$ | 30 | | | V |
| Emitter-Collector Breakdown Voltage | ($I_E$ = 10 µA) | $BV_{ECO}$ | 7 | | | V |
| Collector-Emitter Dark Current | ($V_{CE}$ = 10 V) | $I_{CEO}$ | | | 100 | nA |

### TRANSFER CHARACTERISTICS

| DC Characteristic | Test Conditions | Symbol | Min | Typ** | Max | Units |
|---|---|---|---|---|---|---|
| Current Transfer Ratio, | ($I_F$ = 10 mA, $V_{CE}$ = 2 V) | CTR | 30 (300) | 45 (450) | | mA (%) |

### TRANSFER CHARACTERISTICS

| Characteristic | Test Conditions | Symbol | Min | Typ** | Max | Units |
|---|---|---|---|---|---|---|
| **SWITCHING TIMES** | | | | | | |
| Turn-on Time | ($V_{CE}$ = 10 V, $R_L$ = 100Ω, $I_F$ = 5 mA) | $t_{on}$ | | 3.5 | | µs |
| Turn-off Time | | $t_{off}$ | | 95 | | µs |

### ISOLATION CHARACTERISTICS

| Characteristic | Test Conditions | Symbol | Min | Typ** | Max | Units |
|---|---|---|---|---|---|---|
| Input-Output Isolation Voltage | ($I_{I-O}$ ≤ 1 µA, 1 min.) | $V_{ISO}$ | 7500 | | | Vac(pk) |
| | ($I_{I-O}$ ≤ 1 µA, 1 min.) | | 5300 | | | Vac(rms) |
| Isolation Resistance | ($V_{I-O}$ = 500 VDC) | $R_{ISO}$ | | $10^{11}$ | | Ω |
| Isolation Capacitance | (V = 0 V, f = 1 MHz) | $C_{ISO}$ | | 0.2 | | pf |
| Collector - Emitter Saturation Voltage | ($I_C$ = 10 mA, $I_F$ = 10 mA) | $V_{CE\ (SAT)}$ | | | 1 | V |

Note
** Typical values at $T_A$ = 25°C

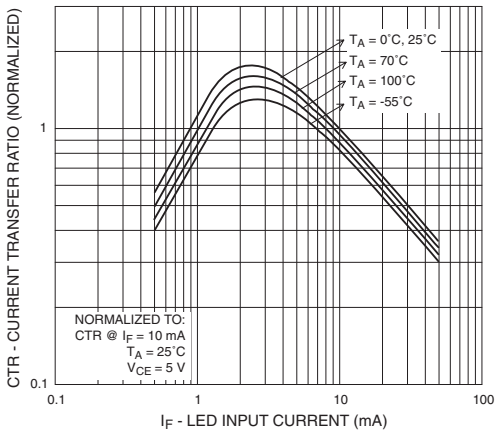



Fig. 1 Output Current vs. Input Current

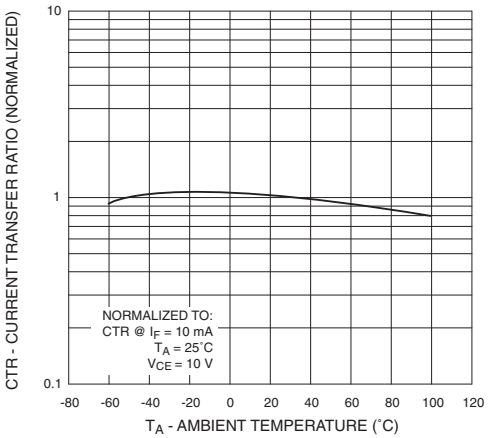



Fig. 2 Current Transfer Ratio vs. Ambient Temperature

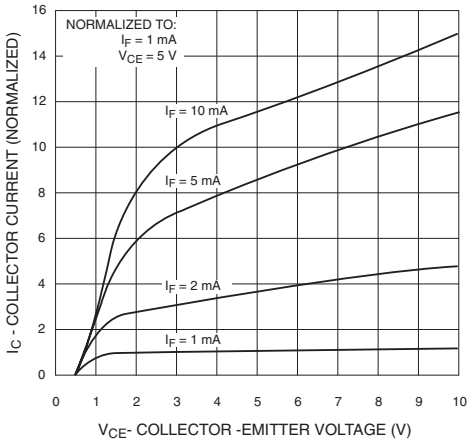



Fig. 3 Collector Current vs. Collector-Emitter Voltage

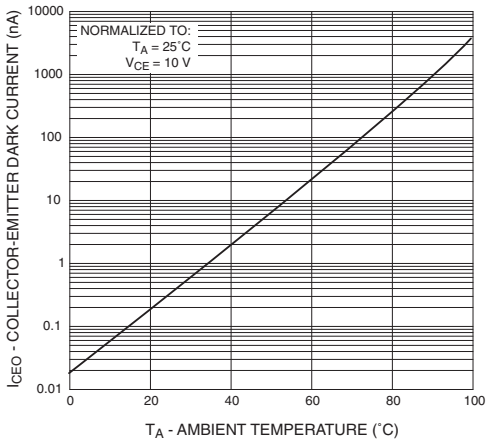



Fig. 4 Dark Current vs. Ambient Temperature

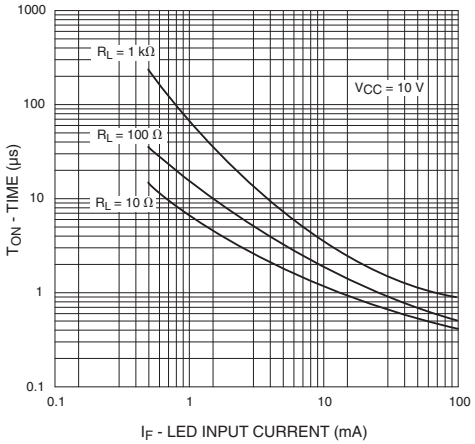



Fig. 5 Turn-On Time vs. Input Current

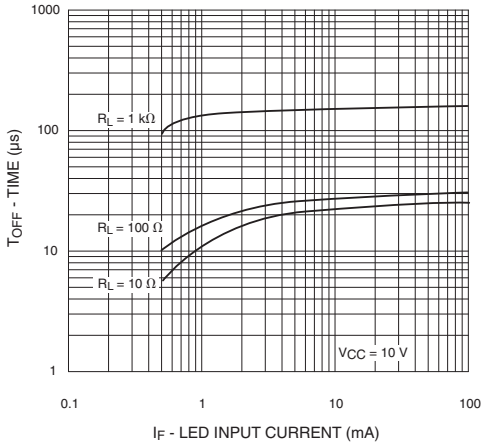
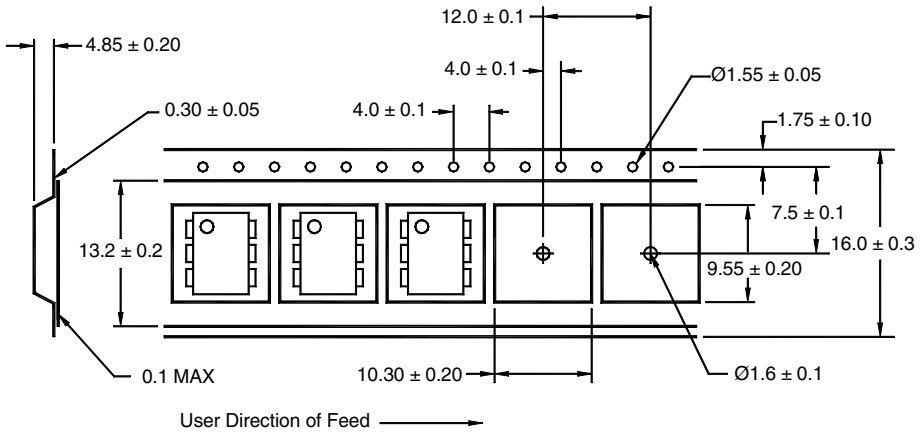



Fig. 6 Turn-Off Time vs. Input Current

## 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 |
| 300 | .300 | VDE 0884 |
| 300W | .300W | VDE 0884, 0.4” Lead Spacing |
| 3S | .3S | VDE 0884, Surface Mount |
| 3SD | .3SD | VDE 0884, Surface Mount, Tape & Reel |

## QT Carrier Tape Specifications (“D” Taping Orientation)



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