

# MOC119M

## Photodarlington Optocoupler (No Base Connection)

### Features

- High current transfer ratio of 300%
- No base connection for improved noise immunity
- Underwriters Laboratory (UL) recognized File #E90700
- IEC 60747-5-2 approval available as a test option – add option 'V' (e.g., MOC119VM)

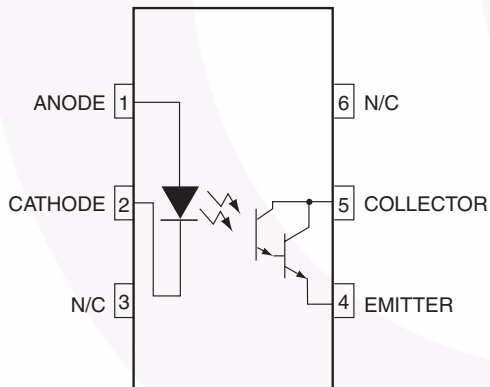
### Applications

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

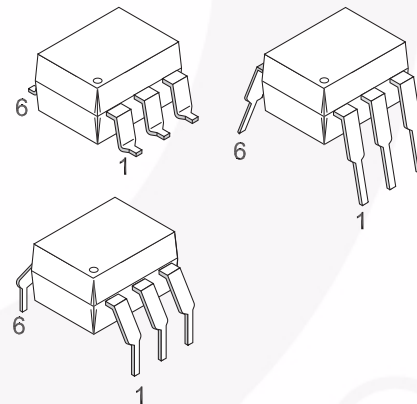
### Description

The MOC119M device has a gallium arsenide infrared emitting diode coupled to a silicon darlington phototransistor.

### Schematic



### Package Outlines



**Absolute Maximum Ratings** ( $T_A = 25^\circ\text{C}$  unless otherwise specified.)

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

| Symbol              | Parameter  | Value          | Units                |
|---------------------|--|----------------|----------------------|
| <b>TOTAL DEVICE</b> |  |                |                      |
| $T_{STG}$           | Storage Temperature  | -40 to +150    | $^\circ\text{C}$     |
| $T_{OPR}$           | Operating Temperature  | -40 to +100    | $^\circ\text{C}$     |
| $T_{SOL}$           | Lead Solder Temperature (wave solder)  | 260 for 10 sec | $^\circ\text{C}$     |
| $P_D$               | Total Device Power Dissipation @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | 250            | mW                   |
|                     |  | 2.94           | mW/ $^\circ\text{C}$ |
| <b>EMITTER</b>      |  |                |                      |
| $I_F$               | DC/Average Forward Input Current   | 60             | mA                   |
| $V_R$               | Reverse Input Voltage  | 3              | V                    |
| $P_D$               | LED Power Dissipation @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$          | 120            | mW                   |
|                     |  | 1.41           | mW/ $^\circ\text{C}$ |
| <b>DETECTOR</b>     |  |                |                      |
| $V_{CEO}$           | Collector-Emitter Voltage  | 30             | V                    |
| $V_{ECO}$           | Emitter-Collector Voltage  | 7              | V                    |
| $P_D$               | Detector Power Dissipation @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$     | 150            | mW                   |
|                     |  | 1.76           | mW/ $^\circ\text{C}$ |
| $I_C$               | Continuous Collector Current   | 150            | mA                   |

**Electrical Characteristics** ( $T_A = 25^\circ\text{C}$  unless otherwise specified.)**Individual Component Characteristics**

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

**Transfer Characteristics**

| Symbol                 | Parameter                            | Test Conditions                         | Min. | Typ.* | Max. | Units         |
|------------------------|--------------------------------------|---|------|-------|------|---------------|
| <b>DETECTOR</b>        |                                      |   |      |       |      |               |
| CTR                    | Current Transfer Ratio               | $I_F = 10\text{mA}, V_{CE} = 2\text{V}$ | 300  | 450   |      | %             |
| $V_{CE(SAT)}$          | Collector-Emitter Saturation Voltage | $I_C = 10\text{mA}, I_F = 10\text{mA}$  |      |       | 1    | V             |
| <b>SWITCHING TIMES</b> |                                      |   |      |       |      |               |
| $t_{on}$               | Turn-on Time                         | $V_{CE} = 10\text{V}, R_L = 100\Omega,$ |      | 3.5   |      | $\mu\text{s}$ |
| $t_{off}$              | Turn-off Time                        | $I_F = 5\text{mA}$                      |      | 95    |      | $\mu\text{s}$ |

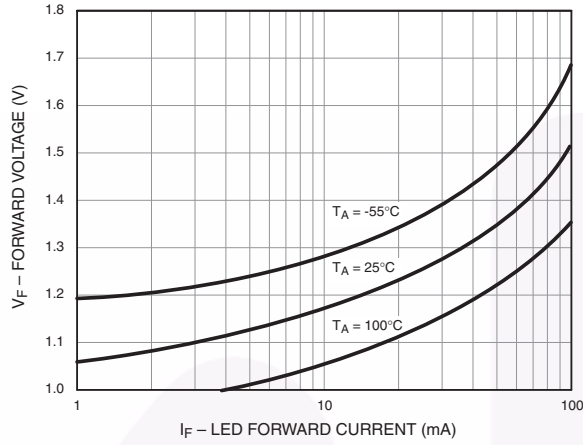
**Isolation Characteristics**

| Symbol    | Characteristic                 | Test Conditions                      | Min. | Typ.*     | Max. | Units    |
|-----------|--------------------------------|--------------------------------------|------|-----------|------|----------|
| $V_{ISO}$ | Input-Output Isolation Voltage | $f = 60\text{Hz}, t = 1\text{ sec.}$ | 7500 |           |      | Vac(pk)  |
| $R_{ISO}$ | Isolation Resistance           | $V_{I-O} = 500\text{VDC}$            |      | $10^{11}$ |      | $\Omega$ |
| $C_{ISO}$ | Isolation Capacitance          | $V = 0\text{V}, f = 1\text{MHz}$     |      | 0.2       |      | pF       |

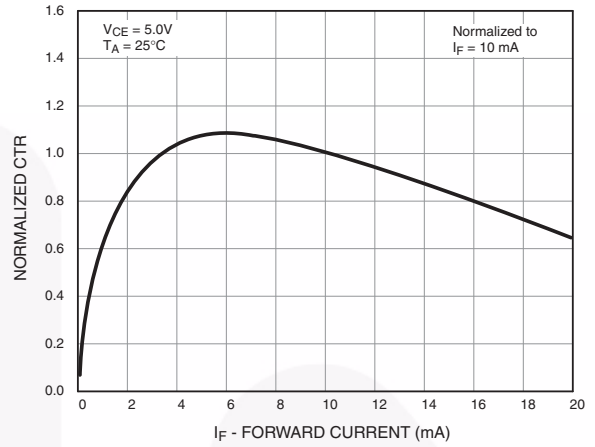
\*Typical values at  $T_A = 25^\circ\text{C}$

## Typical Performance Curves

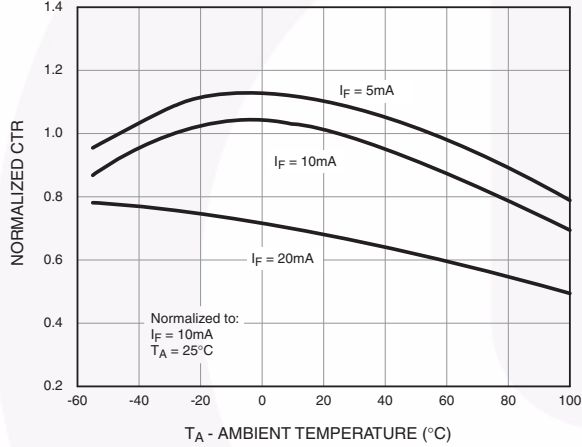
**Fig. 1 LED Forward Voltage vs. Forward Current**



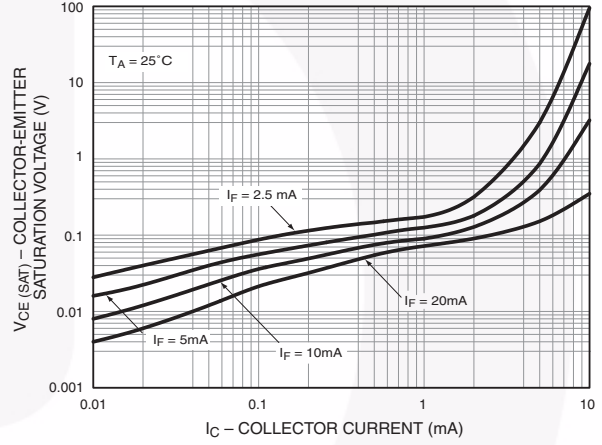
**Fig. 2 Normalized CTR vs. Forward Current**



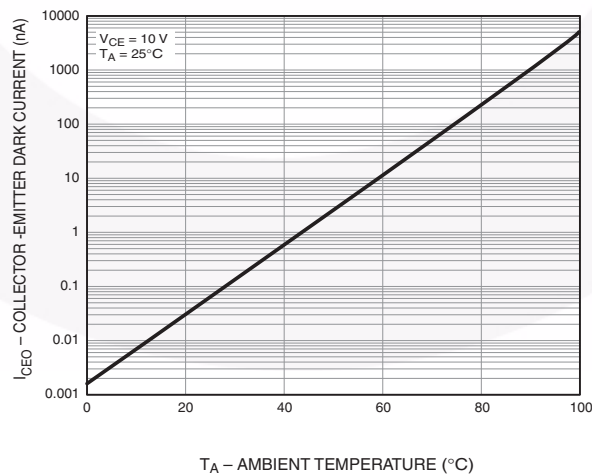
**Fig. 3 Normalized CTR vs. Ambient Temperature**



**Fig. 4 Collector-Emitter Saturation Voltage vs. Collector Current**

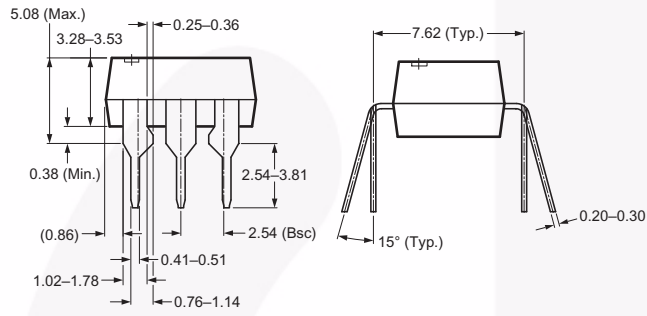
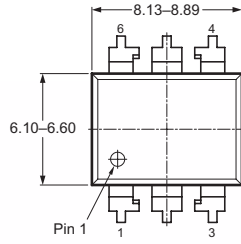


**Fig. 5 Dark Current vs. Ambient Temperature**

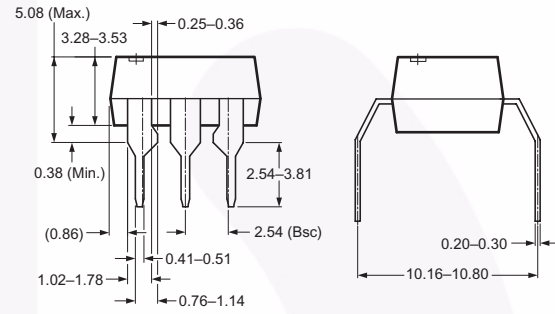
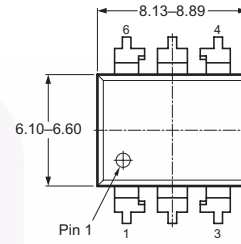


## Package Dimensions

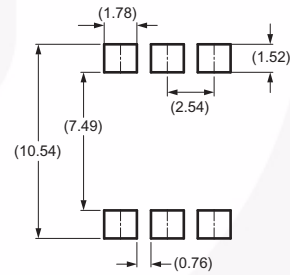
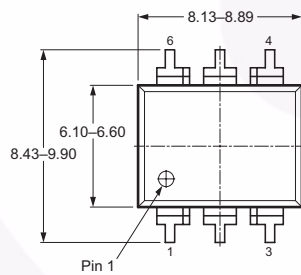
### Through Hole



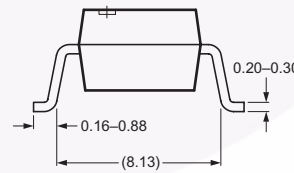
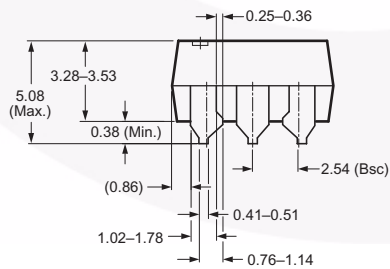
### 0.4" Lead Spacing



### Surface Mount



Recommended Pad Layout

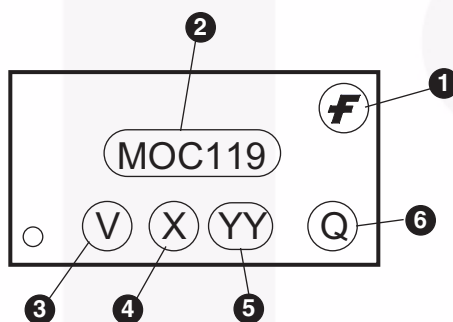


**Note:**  
All dimensions in mm.

## Ordering Information

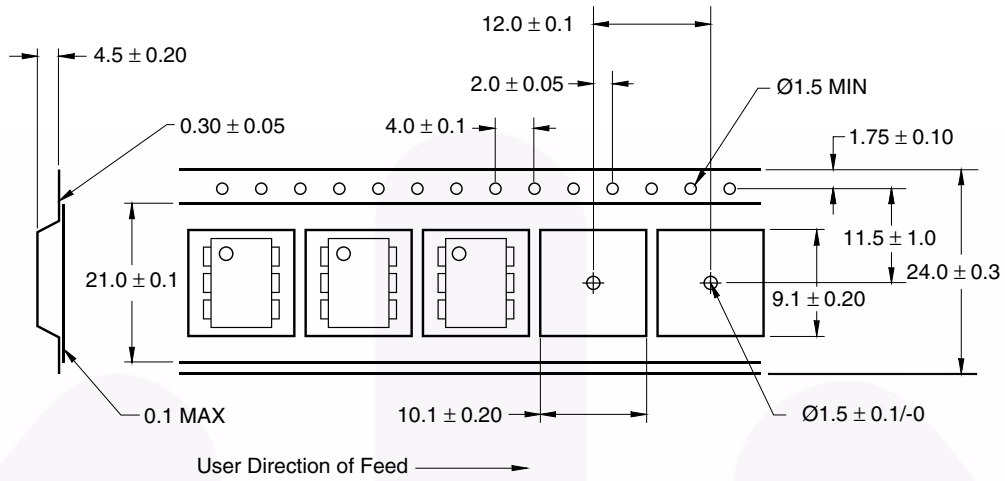
| Suffix    | Example     | Option   |
|-----------|-------------|--|
| No Suffix | MOC119M     | Standard Through Hole Device (50 units per tube)                         |
| S         | MOC119SM    | Surface Mount Lead Bend  |
| SR2       | MOC119SR2M  | Surface Mount; Tape and Reel (1,000 units per reel)                      |
| T         | MOC119TM    | 0.4" Lead Spacing  |
| V         | MOC119VM    | IEC60747-5-2 approved  |
| TV        | MOC119TVM   | IEC60747-5-2 approved, 0.4" Lead Spacing                                 |
| SV        | MOC119SVM   | IEC60747-5-2 approved, Surface Mount                                     |
| SR2V      | MOC119SR2VM | IEC60747-5-2 approved, Surface Mount, Tape & Reel (1,000 units per reel) |

## Marking Information



| Definitions |  |
|-------------|--|
| 1           | Fairchild logo   |
| 2           | Device number  |
| 3           | VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table) |
| 4           | One digit year code, e.g., '7'   |
| 5           | Two digit work week ranging from '01' to '53'  |
| 6           | Assembly package code  |

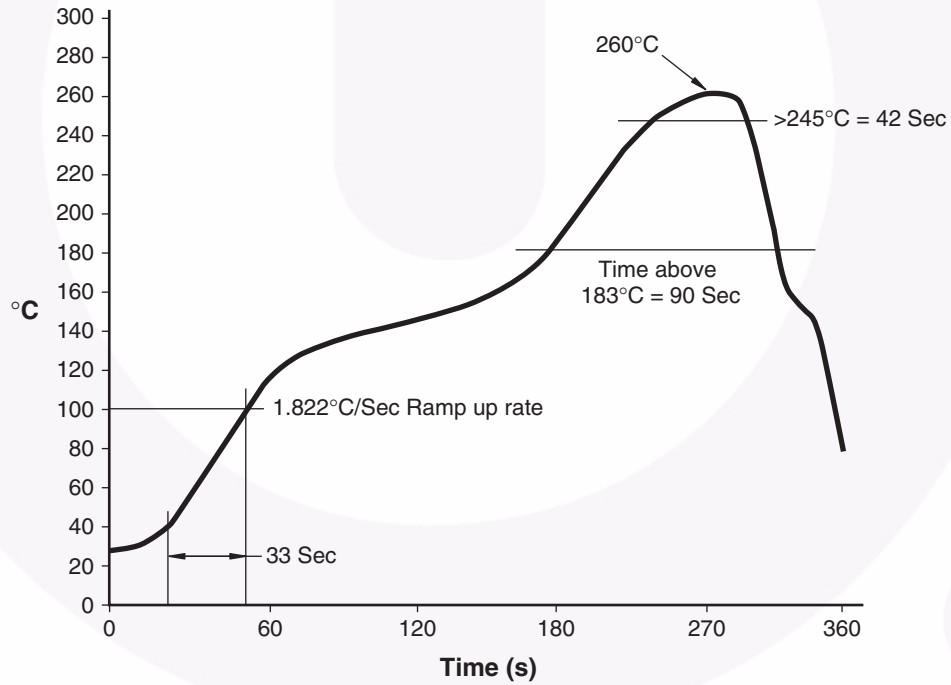
### Tape Dimensions



**Note:**

All dimensions are in millimeters.






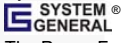
### Reflow Soldering Profile





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