

# 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)

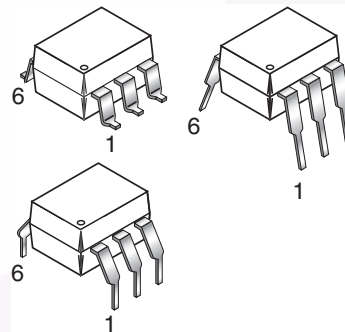
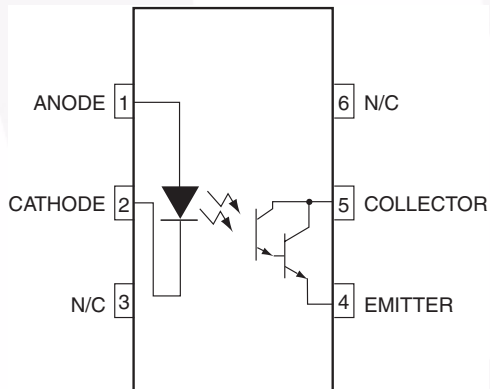
## Applications

- 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



**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 @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	250	mW
		2.94	$\text{mW}/^\circ\text{C}$
<b>EMITTER</b>			
$I_F$	DC/Average Forward Input Current	60	mA
$V_R$	Reverse Input Voltage	3	V
$P_D$	LED Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	120	mW
		1.41	$\text{mW}/^\circ\text{C}$
<b>DETECTOR</b>			
$V_{CEO}$	Collector-Emitter Voltage	30	V
$V_{ECO}$	Emitter-Collector Voltage	7	V
$P_D$	Detector Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	150	mW
		1.76	$\text{mW}/^\circ\text{C}$
$I_C$	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		$\mu\text{s}$

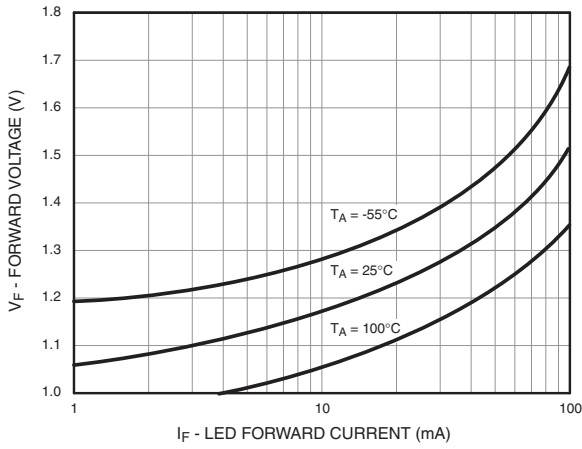
**Isolation Characteristics**

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

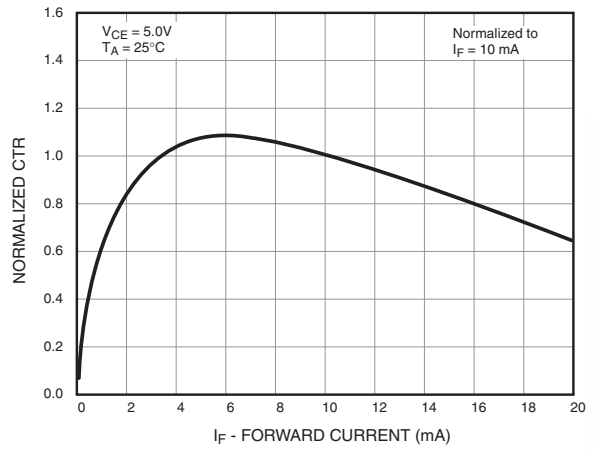
\*Typical values at  $T_A = 25^\circ\text{C}$

## Typical Performance Curves

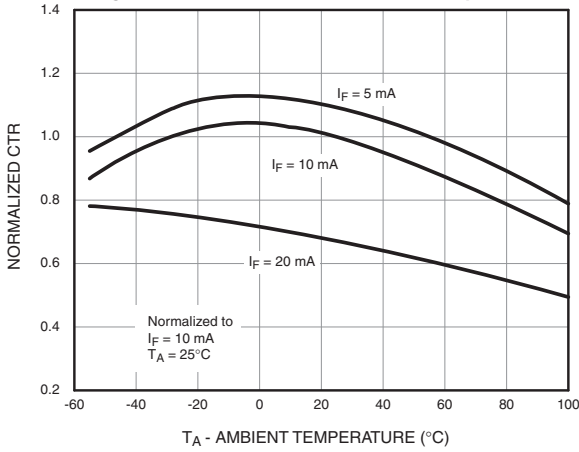
**Fig. 1 LED Forward Voltage vs. Forward Current**



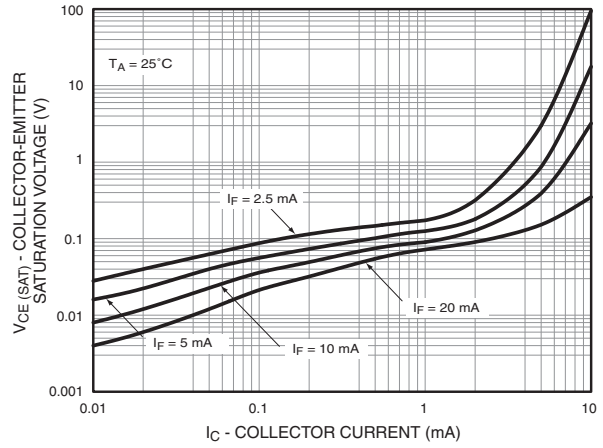
**Fig. 2 Normalized CTR vs. Forward Current**



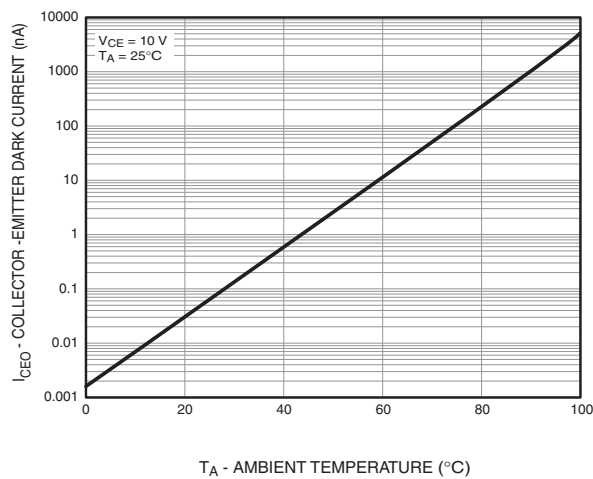
**Fig. 3 Normalized CTR vs. Ambient Temperature**



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

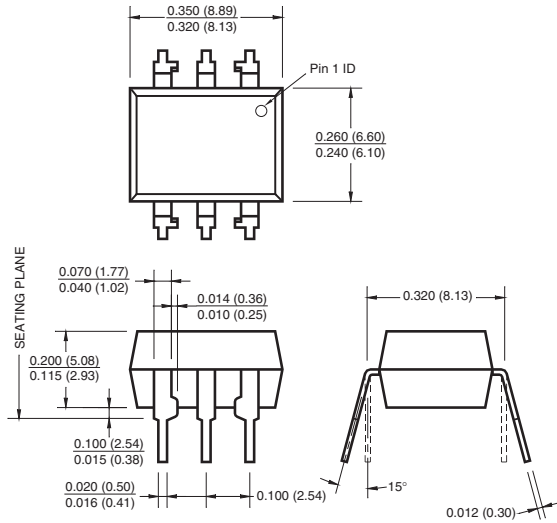


**Fig. 5 Dark Current vs. Ambient Temperature**

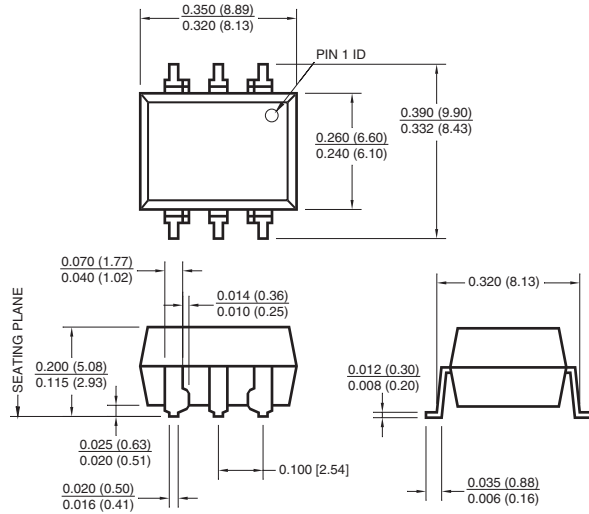


## Package Dimensions

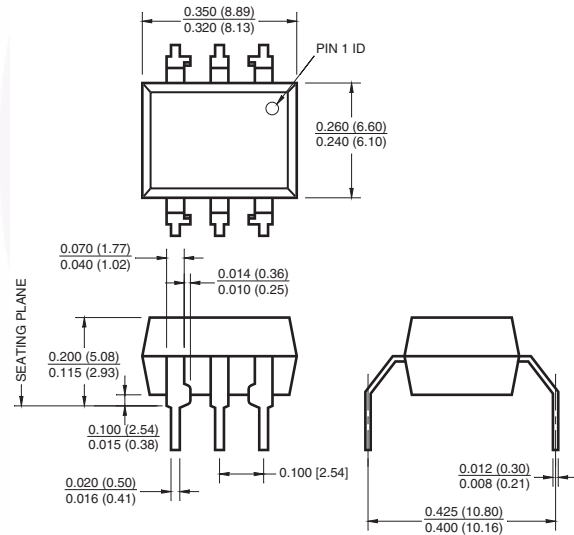
### Through Hole



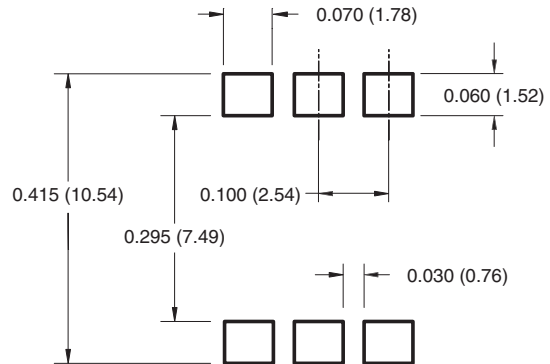
### Surface Mount



### 0.4" Lead Spacing



### Recommended Pay Layout for Surface Mount Leadform



#### Note:

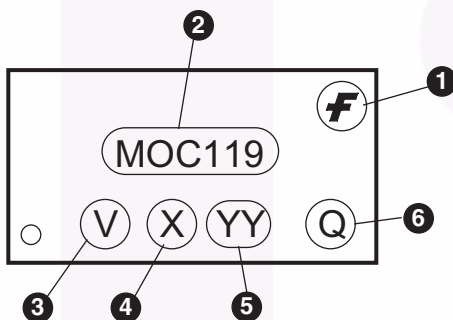
All dimensions are in inches (millimeters).



## Ordering Information

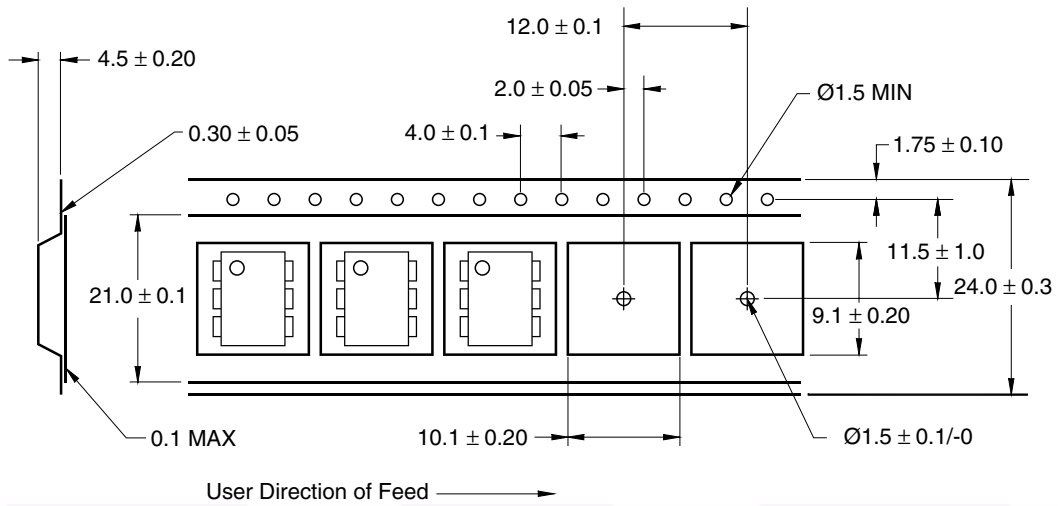
Suffix	Example	Option
No Suffix	MOC119M	Standard Through Hole Device (50 units per tube)
S	MOC119SM	Surface Mount Lead Bend
SR2	MOC119SR2M	Surface Mount; Tape and Reel (1,000 units per reel)
T	MOC119TM	0.4" Lead Spacing
V	MOC119VM	IEC60747-5-2 approved
TV	MOC119TVM	IEC60747-5-2 approved, 0.4" Lead Spacing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

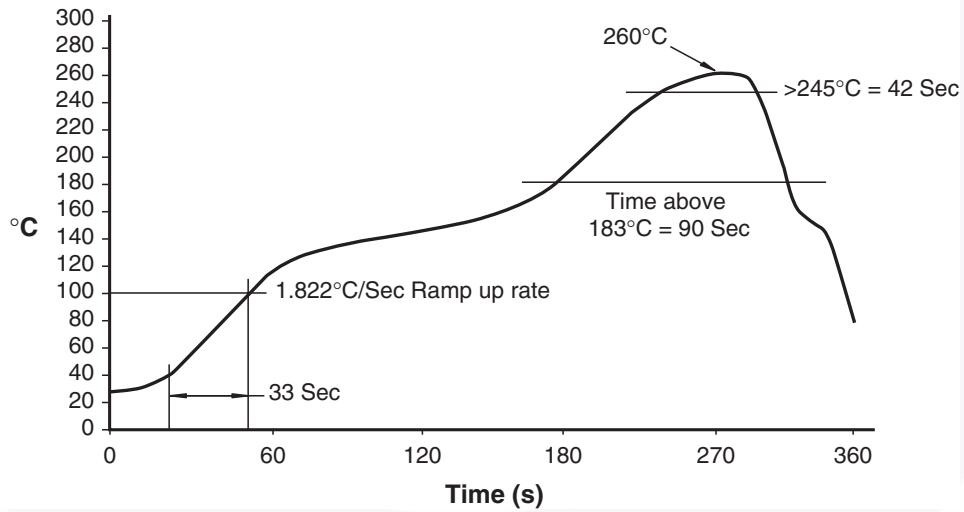
### Tape Dimensions



**Note:**

All dimensions are in millimeters.


### Reflow Soldering Profile





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Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
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