

# MOC256M

## AC Input Phototransistor Small Outline Surface Mount Optocouplers

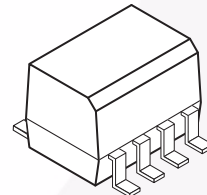
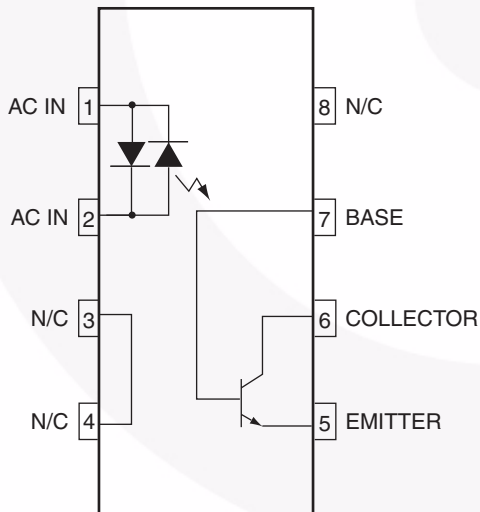
### Features

- UL recognized file (#E90700, Volume 2)
- VDE recognized (File #136616)
  - Ordering option V (i.e. MOC256VM)
- Industry standard SOIC-8 surface mountable package, with 0.050" lead spacing
- Available in tape and reel option
- Bidirectional AC input (protection against reversed DC bias)
- Guaranteed CTR symmetry of 2:1 maximum
- High input-output isolation of 2500 Vac (rms) guaranteed

### Description

The MOC256M is an AC input phototransistor optocoupler. The device consists of two infrared emitters connected in anti-parallel and coupled to a silicon NPN phototransistor detector. It is designed for applications requiring the detection or monitoring of AC signals. The device is constructed with a standard SOIC-8 footprint.

### 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	Rating	Value	Unit
<b>EMITTER</b>			
$I_F$	Forward Current – Continuous	60	mA
$I_F$ (pk)	Forward Current – Peak (PW = 100 $\mu$ s, 120 pps)	1.0	A
$P_D$	LED Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	90	mW
		0.8	mW/ $^\circ\text{C}$
<b>DETECTOR</b>			
$V_{CEO}$	Collector-Emitter Voltage	30	V
$V_{ECO}$	Emitter-Base Voltage	7.0	V
$I_C$	Collector Current-Continuous	150	mA
$P_D$	Detector Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	150	mW
		1.76	mW/ $^\circ\text{C}$
<b>TOTAL DEVICE</b>			
$V_{ISO}$	Input-Output Isolation Voltage (f = 60Hz, t = 1 min.)	2500	Vac(rms)
$P_D$	Total Device Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	250	mW
		2.94	mW/ $^\circ\text{C}$
$T_A$	Ambient Operating Temperature Range	-40 to +100	$^\circ\text{C}$
$T_{stg}$	Storage Temperature Range	-40 to +150	$^\circ\text{C}$

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

Symbol	Parameter	Test Conditions	Min.	Typ.*	Max.	Unit
<b>EMITTER</b>						
$V_F$	Input Forward Voltage	$I_F = \pm 10\text{mA}$		1.2	1.5	V
$C_J$	Input Capacitance	$V = 0\text{V}, f = 1\text{MHz}$		20		pF
<b>DETECTOR</b>						
$I_{CEO1}$	Collector-Emitter Dark Current	$V_{CE} = 10\text{V}, T_A = 25^\circ\text{C}$		1.0	100	nA
$I_{CEO2}$		$V_{CE} = 10\text{V}, T_A = 100^\circ\text{C}$		1.0		$\mu\text{A}$
$I_{CBO}$	Collector-Base Dark Current	$V_{CB} = 10\text{V}$		0.2		nA
$BV_{CEO}$	Collector-Emitter Breakdown Voltage	$I_C = 10\text{mA}$	30	100		nA
$BV_{CBO}$	Collector-Base Breakdown Voltage	$I_C = 100\mu\text{A}$	70	120		V
$BV_{ECO}$	Emitter-Collector Breakdown Voltage	$I_E = 100\mu\text{A}$	5	10		V
$C_{CE}$	Collector-Emitter Capacitance	$f = 1.0\text{MHz}, V_{CE} = 0$		7		pF
$C_{CB}$	Collector-Base Capacitance	$f = 1.0\text{MHz}, V_{CB} = 0$		20		pF
$C_{EB}$	Emitter-Base Capacitance	$f = 1.0\text{MHz}, V_{EB} = 0$		10		pF
<b>COUPLED</b>						
CTR	Current Transfer Ratio <sup>(1)</sup>	$I_F = \pm 10\text{mA}, V_{CE} = 10\text{V}$	20	150		%
	Output-Collector Current Symmetry	$\left( \frac{I_C @ I_F = +10\text{mA}, V_{CE} = 10\text{V}}{I_C @ I_F = -10\text{mA}, V_{CE} = 10\text{V}} \right)$	0.5		2.0	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 0.5\text{mA}, I_F = \pm 10\text{mA}$		0.1	0.4	V
$V_{ISO}$	Isolation Surge Voltage <sup>(2)(3)</sup>	$f = 60\text{Hz AC Peak}, t = \text{min.}$	2500			Vac(rms)
$R_{ISO}$	Isolation Resistance <sup>(3)</sup>	$V = 500\text{V}$	$10^{11}$			$\Omega$
$C_{ISO}$	Isolation Capacitance <sup>(3)</sup>	$V = 0\text{V}, f = 1\text{MHz}$	—	0.2		pF

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

1. Current Transfer Ratio (CTR) =  $I_C/I_F \times 100\%$ .
2. Isolation Surge Voltage,  $V_{ISO}$ , is an internal device dielectric breakdown rating.
3. For this test, Pins 1 and 2 are common and Pins 5, 6 and 7 are common.

## Typical Performance Curves

Fig. 1 Input Voltage vs. Input Current

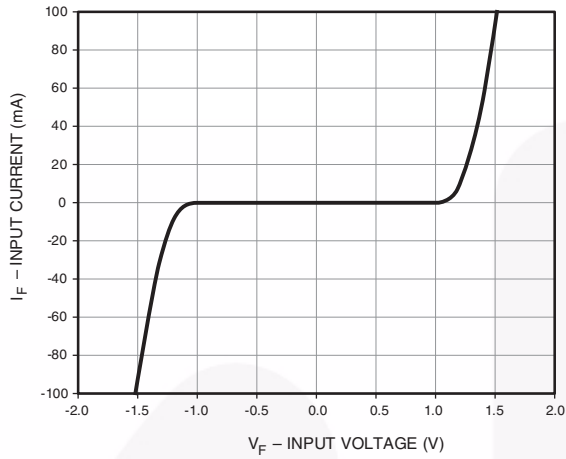


Fig. 2 Output Current vs. Input Current

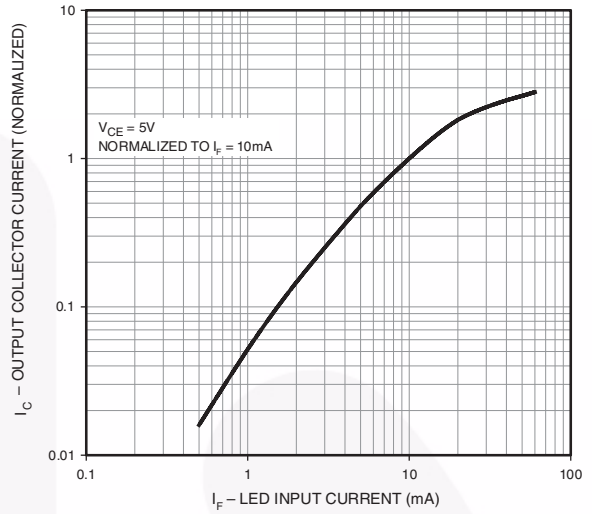


Fig. 3 Output Current vs. Ambient Temperature

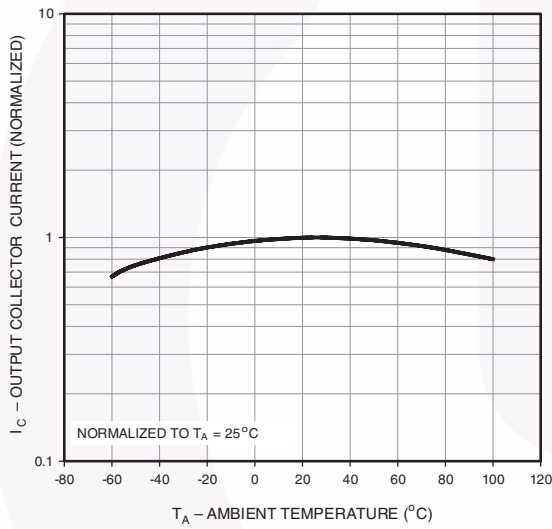


Fig. 4 Output Current vs. Collector - Emitter Voltage

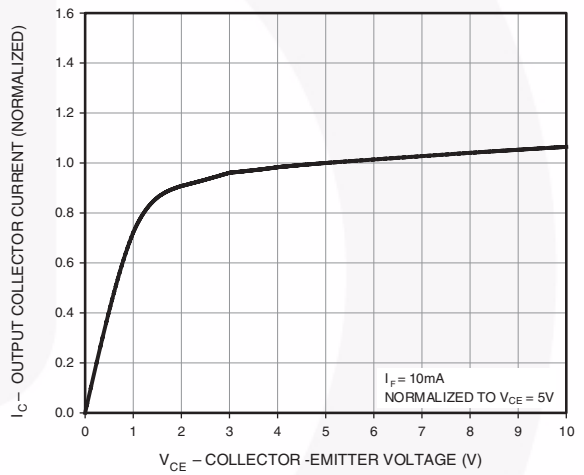
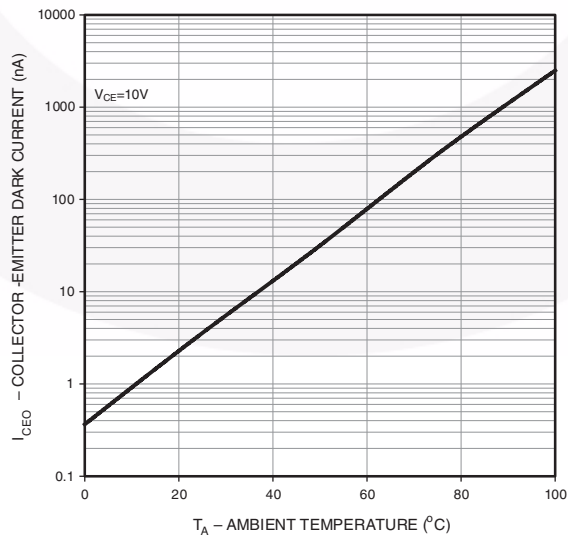
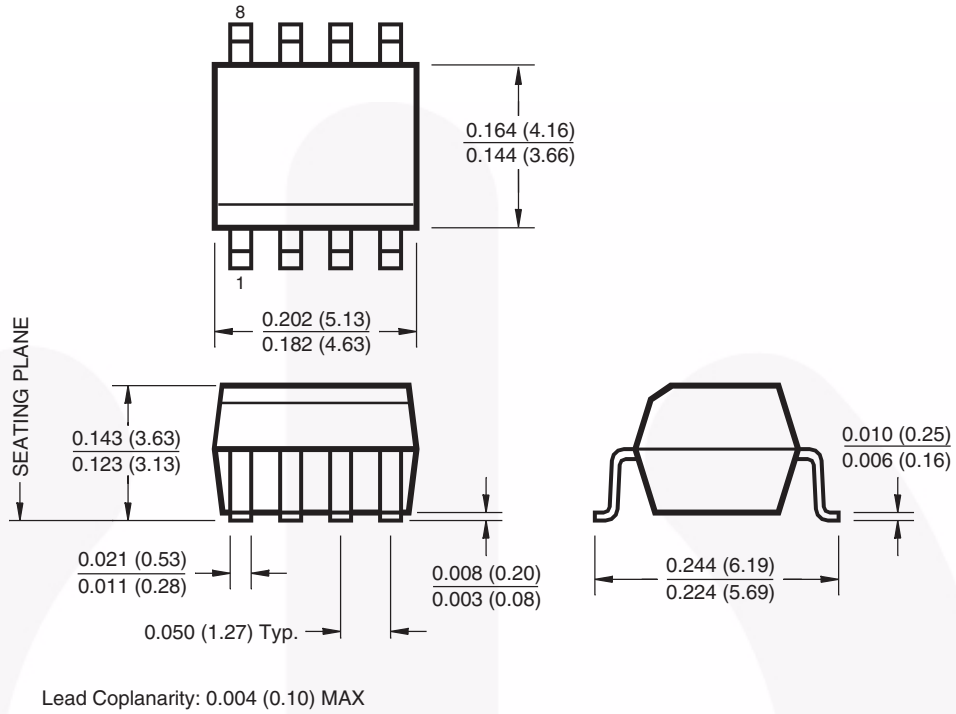


Fig. 5 Dark Current vs. Ambient Temperature

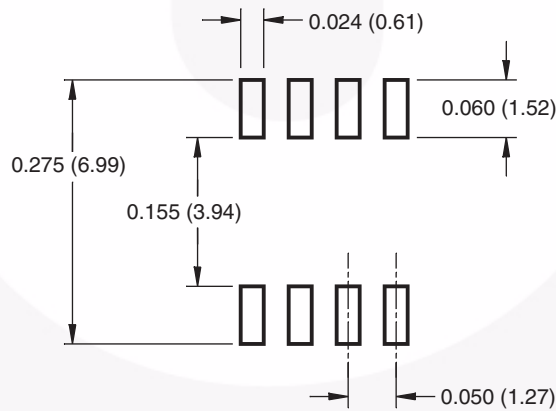


## Package Dimensions

### 8-pin SOIC Surface Mount



### Recommended Pad Layout



Dimensions in inches (mm).

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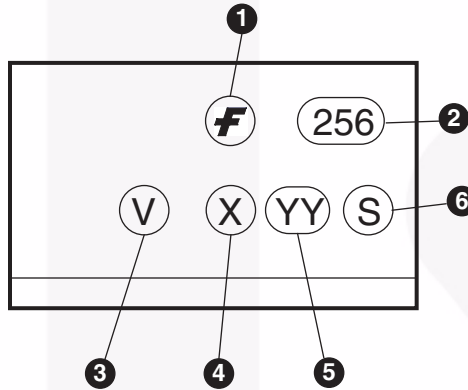
Always visit Fairchild Semiconductor's online packaging area for the most recent package drawings:

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### Ordering Information

Option	Order Entry Identifier	Description
V	V	VDE 0884
R2	R2	Tape and reel (2500 units per reel)
R2V	R2V	VDE 0884, Tape and reel (2500 units per reel)

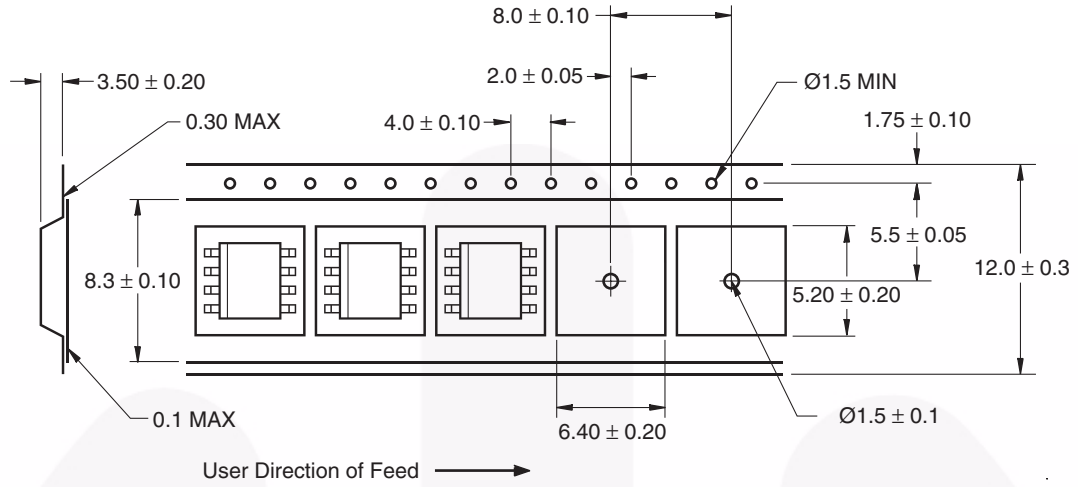
### Marking Information



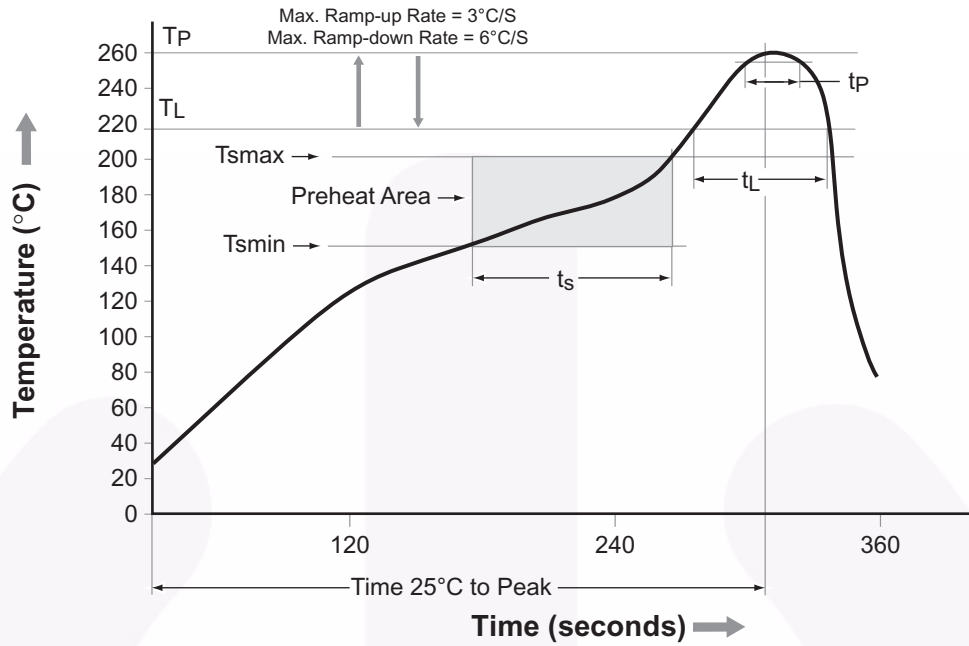
#### Definitions

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., '8'
5	Two digit work week ranging from '01' to '53'
6	Assembly package code

### Carrier Tape Specifications



## Reflow Profile








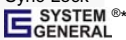
Profile Feature	Pb-Free Assembly Profile
Temperature Min. (T <sub>smín</sub> )	150°C
Temperature Max. (T <sub>smáx</sub> )	200°C
Time (t <sub>s</sub> ) from (T <sub>smín</sub> to T <sub>smáx</sub> )	60–120 seconds
Ramp-up Rate (t <sub>L</sub> to t <sub>p</sub> )	3°C/second max.
Liquidous Temperature (T <sub>L</sub> )	217°C
Time (t <sub>L</sub> ) Maintained Above (T <sub>L</sub> )	60–150 seconds
Peak Body Package Temperature	260°C +0°C / -5°C
Time (t <sub>p</sub> ) within 5°C of 260°C	30 seconds
Ramp-down Rate (T <sub>p</sub> to T <sub>L</sub> )	6°C/second max.
Time 25°C to Peak Temperature	8 minutes max.





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Rev. 140



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**Телефон:** +7 812 627 14 35

**Электронная почта:** [sales@st-electron.ru](mailto:sales@st-electron.ru)

**Адрес:** 198099, Санкт-Петербург,  
Промышленная ул, дом № 19, литера Н,  
помещение 100-Н Офис 331