FAIRCHILD
SEMICONDUCTOR®

April 2009

MOC256M
AC Input Phototransistor Small Outline Surface Mount Optocouplers

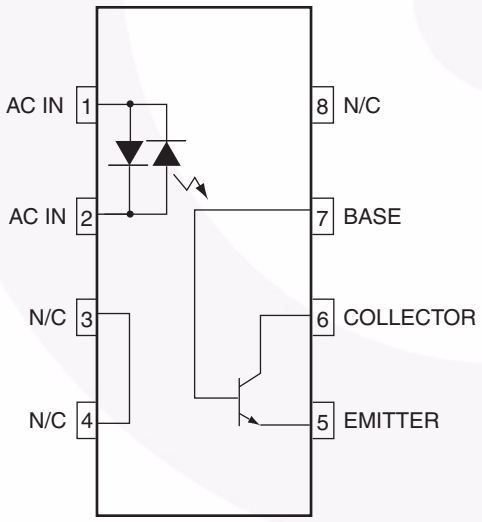
Features

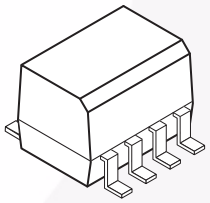
- UL recognized file (#E90700, Volume 2)
- VDE recognized (File #136616)
  - Ordering option V (i.e. MOC256VM)
- Industry standard SOIC-8 surface mountable package, with 0.050" lead spacing
- Available in tape and reel option
- Bidirectional AC input (protection against reversed DC bias)
- Guaranteed 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°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
EMITTER			
I_F	Forward Current – Continuous	60	mA
I_F (pk)	Forward Current – Peak (PW = 100μs, 120 pps)	1.0	A
P_D	LED Power Dissipation @ T_A = 25°C Derate above 25°C	90 0.8	mW mW/°C
DETECTOR			
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°C Derate above 25°C	150 1.76	mW mW/°C
TOTAL DEVICE			
V_{ISO}	Input-Output Isolation Voltage (f = 60Hz, t = 1 min.)	2500	Vac(rms)
P_D	Total Device Power Dissipation @ T_A = 25°C Derate above 25°C	250 2.94	mW mW/°C
T_A	Ambient Operating Temperature Range	-40 to +100	°C
T_{stg}	Storage Temperature Range	-40 to +150	°C

Electrical Characteristics (T_A = 25°C unless otherwise specified)

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

* Typical values at T_A = 25°C

Notes:

1. Current Transfer Ratio (CTR) = I_C/I_F x 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

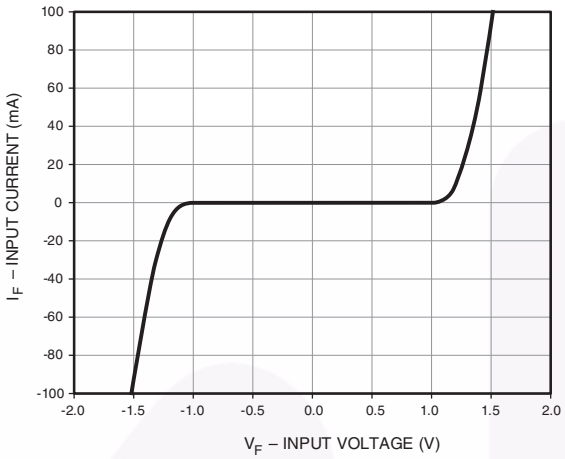


Fig. 2 Output Curent vs. Input Current

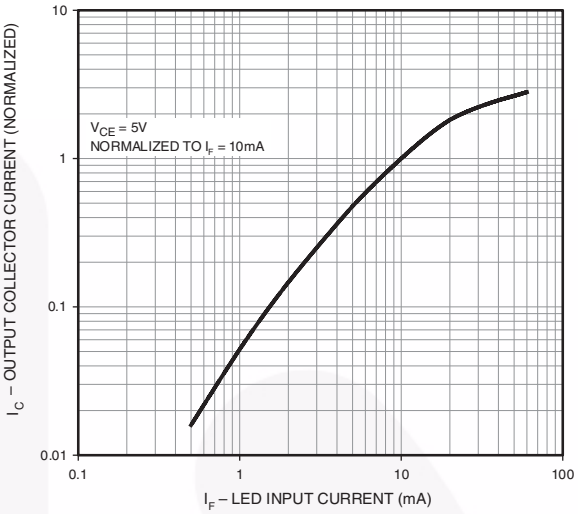


Fig. 3 Output Current vs. Ambient Temperature

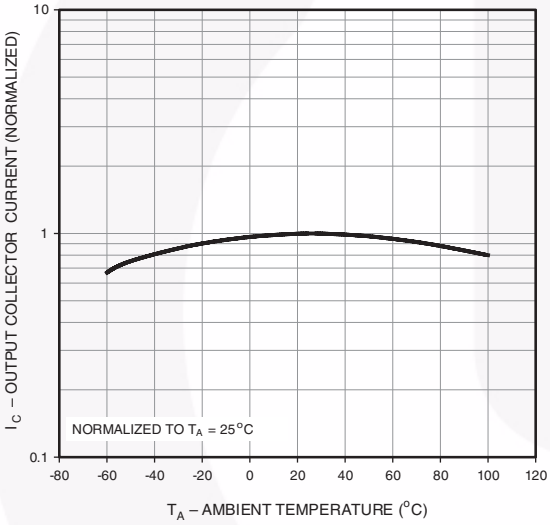


Fig. 4 Output Current vs. Collector - Emitter Voltage

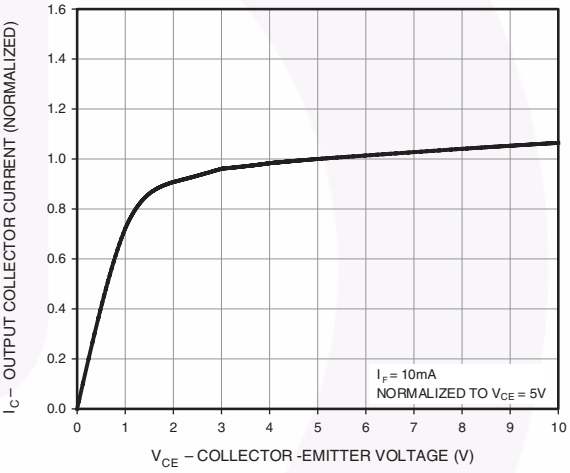
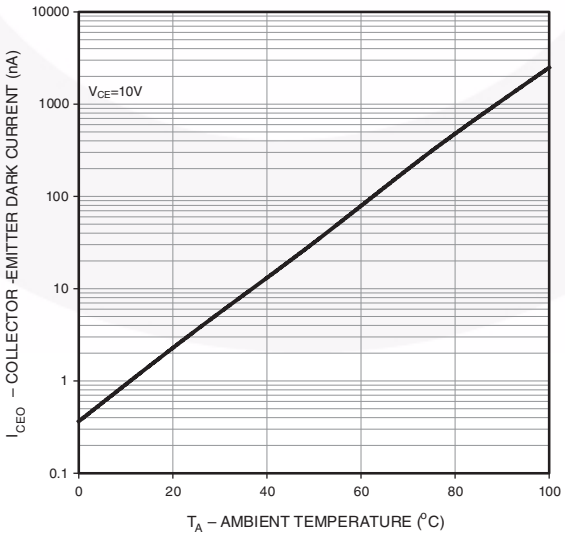
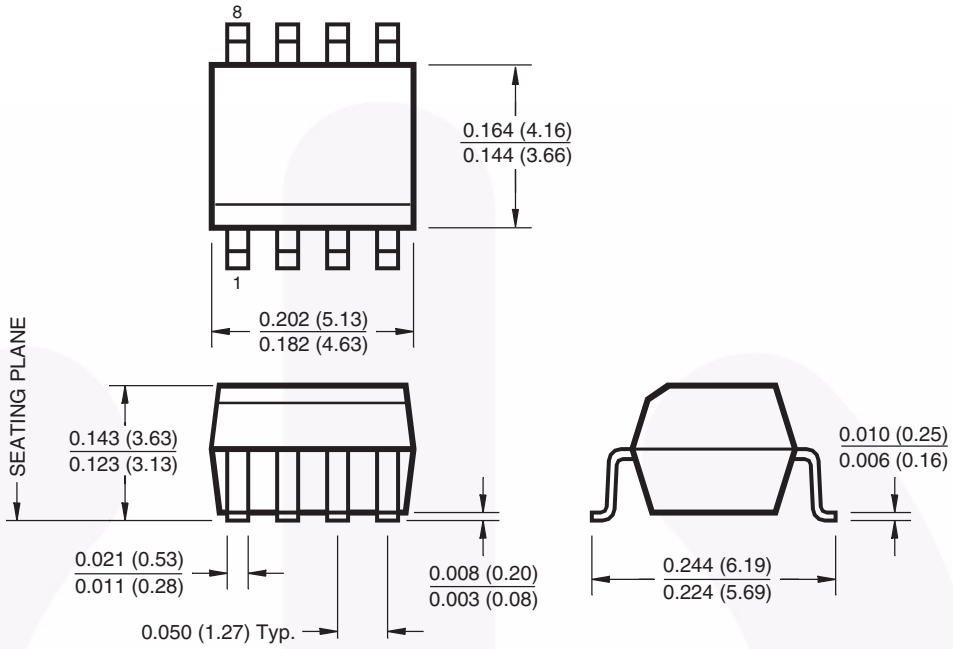


Fig. 5 Dark Current vs. Ambient Temperature



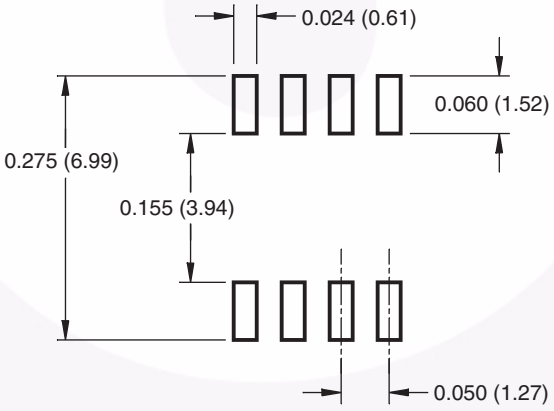
Package Dimensions

8-pin SOIC Surface Mount



Lead Coplanarity: 0.004 (0.10) MAX

Recommended Pad Layout



Dimensions in inches (mm).

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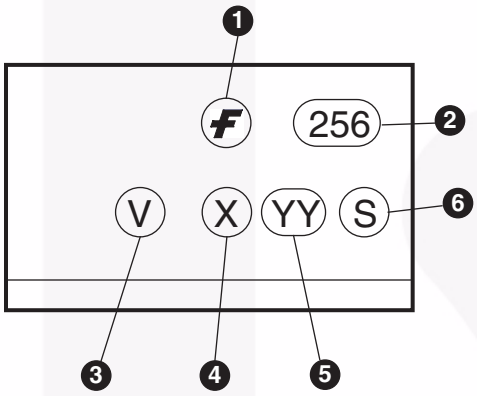
http://www.fairchildsemi.com/packaging/

Ordering Information

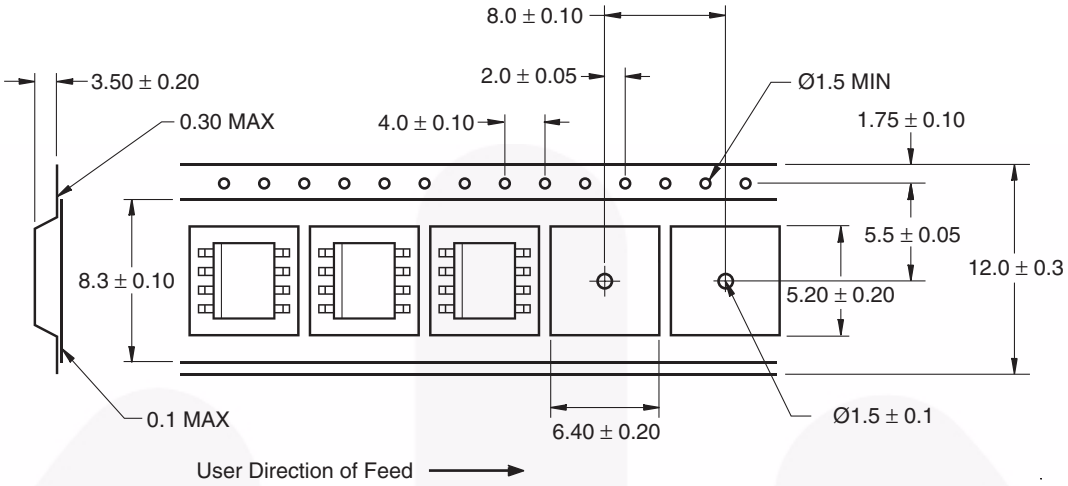
Option	Order Entry Identifier	Description
V	V	VDE 0884
R2	R2	Tape and reel (2500 units per reel)
R2V	R2V	VDE 0884, Tape and reel (2500 units per reel)

Marking Information



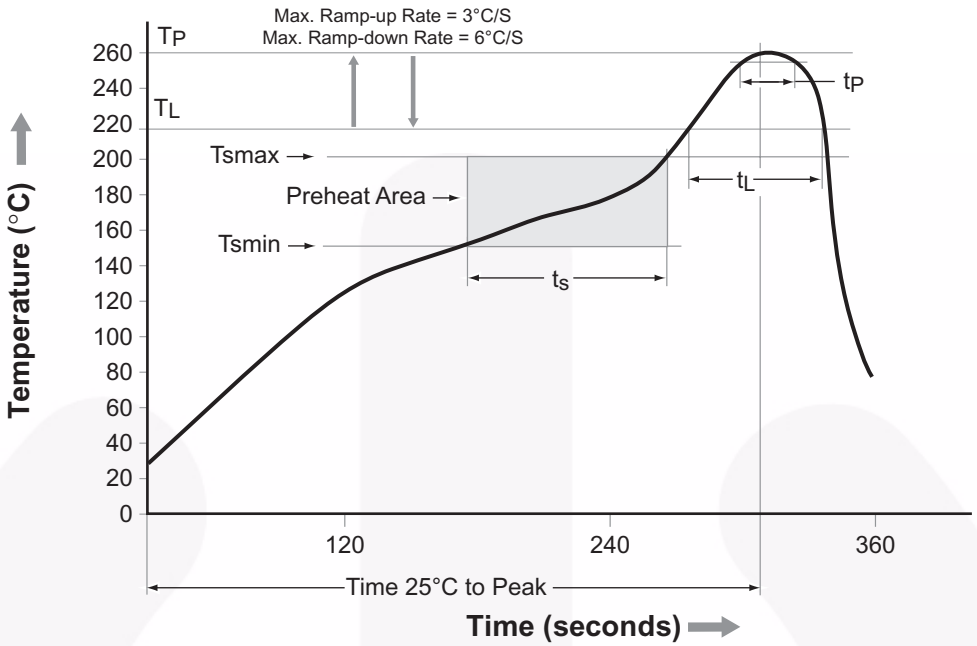
Definitions	
1	Fairchild logo
2	Device number
3	VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)
4	One digit year code, e.g., ‘8’
5	Two digit work week ranging from ‘01’ to ‘53’
6	Assembly package code

Carrier Tape Specifications



Dimensions in mm

Reflow Profile



Profile Feature	Pb-Free Assembly Profile
Temperature Min. (Tsmin)	150°C
Temperature Max. (Tsmax)	200°C
Time (t_S) from (Tsmin to Tsmax)	60–120 seconds
Ramp-up Rate (t_L to t_P)	3°C/second max.
Liquidous Temperature (T_L)	217°C
Time (t_L) Maintained Above (T_L)	60–150 seconds
Peak Body Package Temperature	260°C +0°C / –5°C
Time (t_P) within 5°C of 260°C	30 seconds
Ramp-down Rate (T_P to T_L)	6°C/second max.
Time 25°C to Peak Temperature	8 minutes max.

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Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
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