



# MOC8030-M, MOC8050-M Photodarlington Optocoupler (No Base Connection)

## Features

- High  $BV_{CEO}$   
– Minimum 80V
- High current transfer ratio  
– 300% (MOC8030)  
– 500% (MOC8050)
- No base connection for improved noise immunity
- Underwriters Laboratory (UL) recognized  
File #E90700
- VDE recognized (file #102915), – add option V  
(e.g., MOC8030V)

## Applications

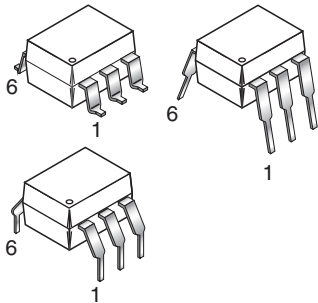
- Appliances, measuring instruments
- I/O interface for computers
- Programmable controllers
- Portable electronics
- Interfacing and coupling systems of different potentials and impedance
- Solid state relays

## Description

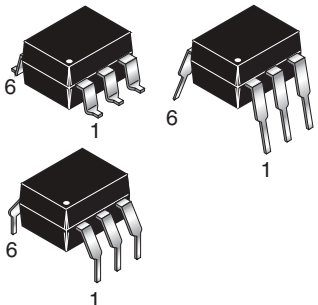
The MOC8030 and MOC8050 are photodarlington-type optically coupled optocouplers. The devices have a gallium arsenide infrared emitting diode coupled with a silicon darlington phototransistor.

## Packages

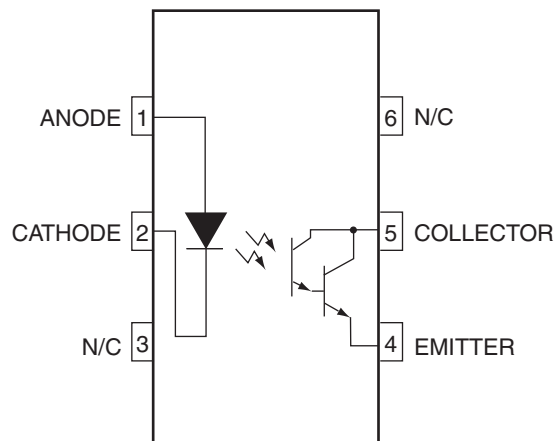
### White Package (-M Suffix)



### Black Package (No -M Suffix)



## Schematic



PDF Support

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

Symbol	Parameter	Value	Units
<b>TOTAL DEVICE</b>			
$T_{STG}$	Storage Temperature	-40 to +150	$^\circ\text{C}$
$T_{OPR}$	Operating Temperature	-40 to +110	$^\circ\text{C}$
$T_{SOL}$	Lead Solder Temperature	260 for 10 sec	$^\circ\text{C}$
$P_D$	Total Device Power Dissipation @ $T_A = 25^\circ\text{C}$	250	mW
	Derate above $25^\circ\text{C}$	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 @ $T_A = 25^\circ\text{C}$	120	mW
	Derate above $25^\circ\text{C}$	1.41	mW/ $^\circ\text{C}$
<b>DETECTOR</b>			
$V_{CEO}$	Collector-Emitter Voltage	80	V
$P_D$	Detector Power Dissipation @ $T_A = 25^\circ\text{C}$	150	mW
	Derate above $25^\circ\text{C}$	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	$I_F = 10\text{mA}$		1.18	2.00	V
$I_R$	Reverse Leakage Current	$V_R = 3.0\text{V}$		0.001	10	$\mu\text{A}$
<b>DETECTOR</b>						
$BV_{CEO}$	Collector-Emitter Breakdown Voltage	$I_C = 1.0\text{mA}, I_F = 0$	80	100		V
$BV_{ECO}$	Emitter-Collector Breakdown Voltage	$I_E = 100\mu\text{A}, I_F = 0$	5	10		V
$I_{CEO}$	Collector-Emitter Dark Current	$V_{CE} = 60\text{V}, I_F = 0$			1	$\mu\text{A}$
$C_{CE}$	Capacitance	$V_{CE} = 0\text{V}, f = 1\text{MHz}$		8		pF

**Transfer Characteristics**

Symbol	Parameter	Test Conditions	Min.	Typ.*	Max.	Unit
<b>DC CHARACTERISTICS</b>						
CTR	Current Transfer Ratio, Collector to Emitter	$I_F = 10\text{mA}, V_{CE} = 1.5\text{V}$	MOC8030	300		%
			MOC8050	500		
<b>AC CHARACTERISTICS</b>						
$t_{on}$	Non-Saturated Turn-on Time	$I_F = 5\text{mA}, V_{CC} = 10\text{V}, R_L = 100\Omega$		8.5		$\mu\text{S}$
$t_{off}$	Turn-off Time	$I_F = 5\text{mA}, V_{CC} = 10\text{V}, R_L = 100\Omega$		37		$\mu\text{S}$
$t_r$	Rise Time	$I_F = 5\text{mA}, V_{CC} = 10\text{V}, R_L = 100\Omega$				$\mu\text{S}$
$t_f$	Fall Time	$I_F = 5\text{mA}, V_{CC} = 10\text{V}, R_L = 100\Omega$				$\mu\text{S}$

**Isolation Characteristics**

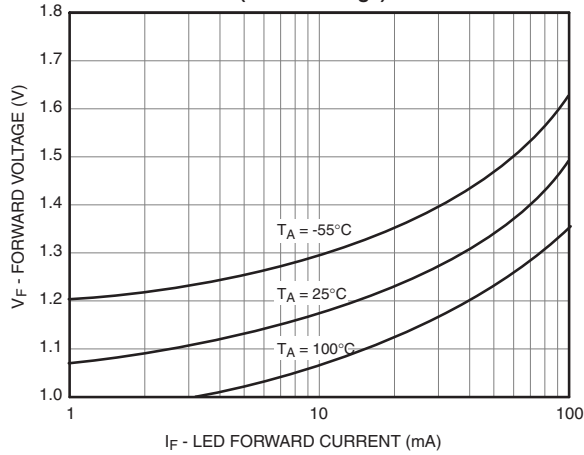
Symbol	Characteristic	Test Conditions	Min.	Typ.	Max.	Units
$V_{ISO}$	Input-Output Isolation Voltage Non '-M', Black Package	$f = 60\text{Hz}, t = 1\text{ min.}$	5300			$\text{Vac}(\text{rms})^{(1)}$
	'-M', White Package	$f = 60\text{Hz}, t = 1\text{ min.}$	7500			$\text{Vac}(\text{pk})$
$R_{ISO}$	Isolation Resistance	$V_{I-O} = 500\text{VDC}$	$10^{11}$			$\Omega$
$C_{ISO}$	Isolation Capacitance Non '-M', Black Package	$V_{I-O} = \emptyset, f = 1\text{MHz}$		0.5		pF
	'-M', White Package			0.2	2	pF

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

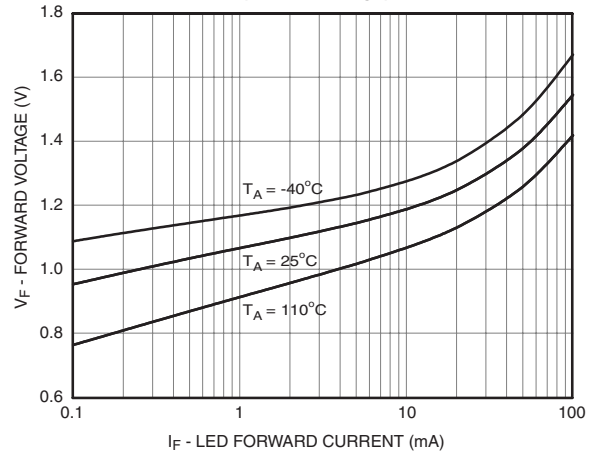
1. 5300 Vac(rms) for 1 minute equates to approximately 9000 Vac(pk) for 1 second.

## Typical Performance Curves

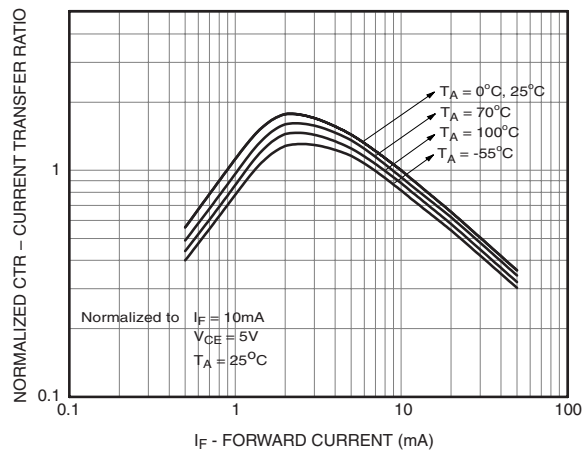
**Fig. 1 LED Forward Voltage vs. Forward Current (Black Package)**



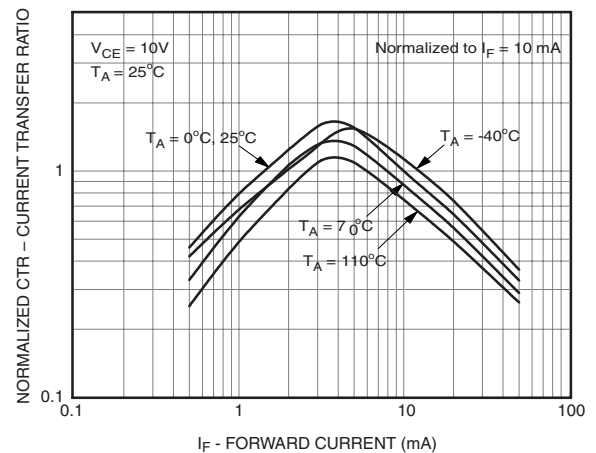
**Fig. 2 LED Forward Voltage vs. Forward Current (White Package)**



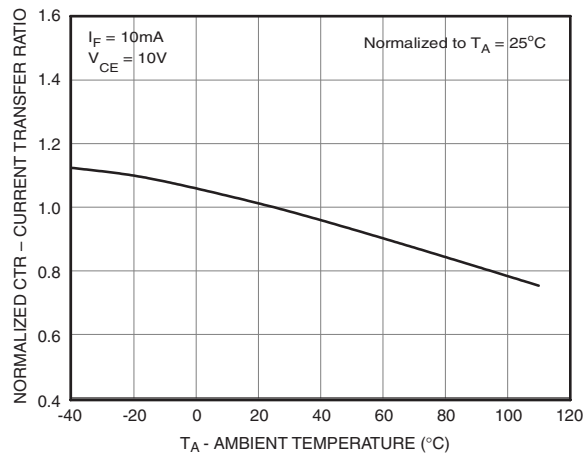
**Fig. 3 Normalized CTR vs. Forward Current (Black Package)**



**Fig. 4 Normalized CTR vs. Forward Current (White Package)**

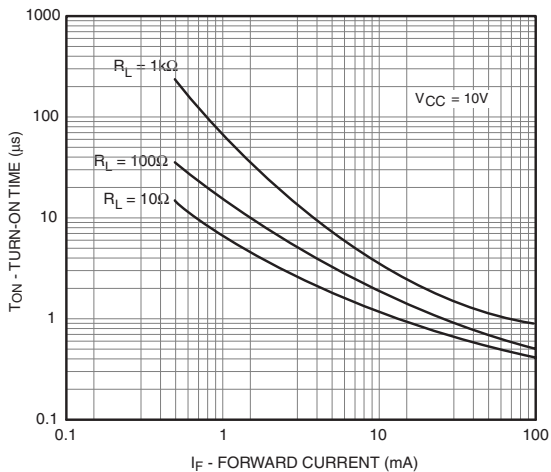


**Fig. 5 Normalized CTR vs. Ambient Temperature (White Package)**

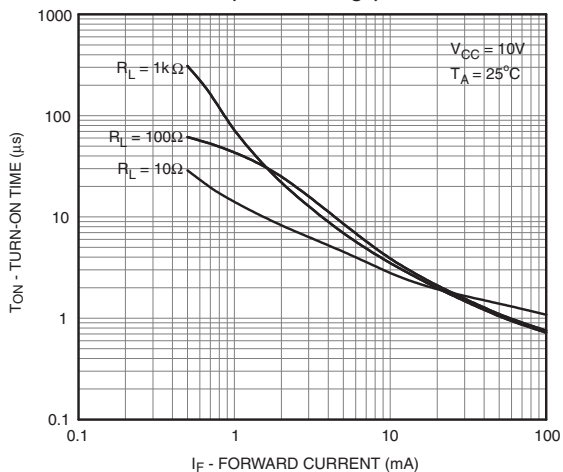


## Typical Performance Curves (Continued)

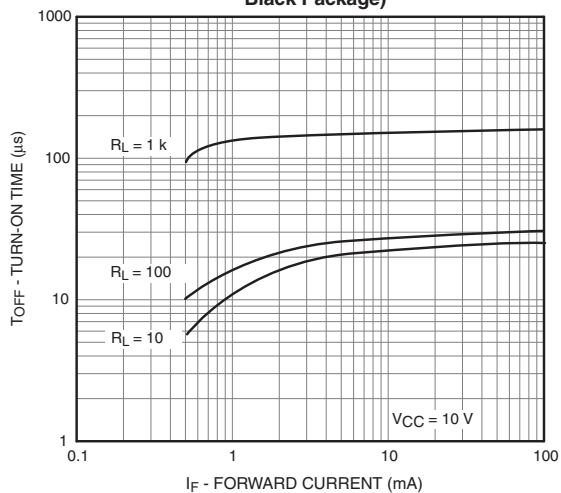
**Fig. 6 Turn-on Time vs. Forward Current (Black Package)**



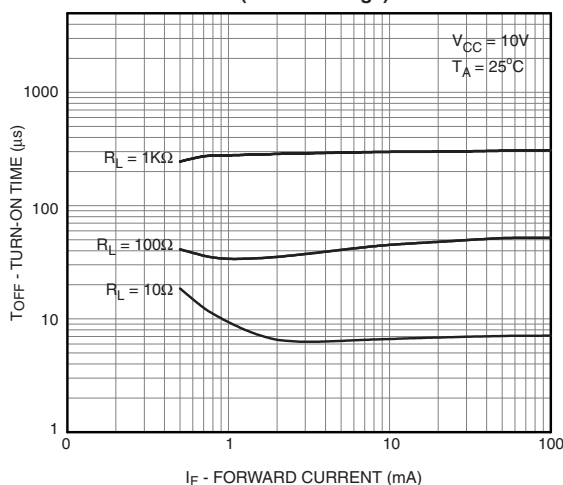
**Fig. 7 Turn-on Time vs. Forward Current (White Package)**



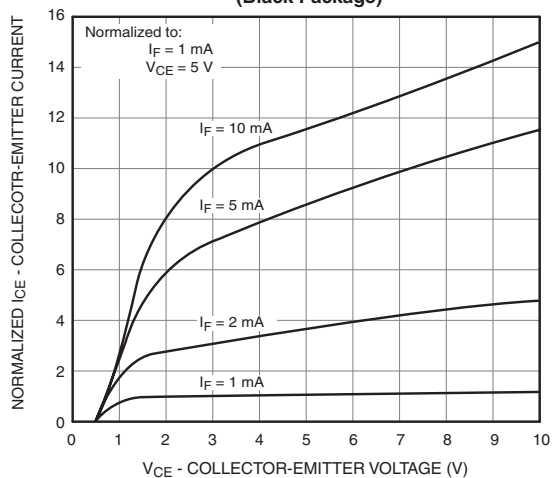
**Fig. 8 Turn-off Time vs. Forward Current (Black Package)**



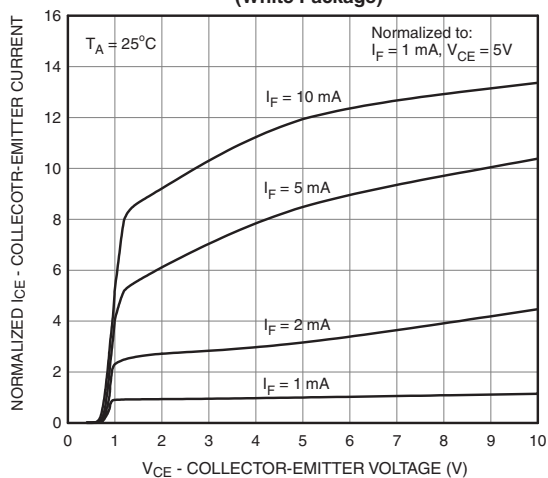
**Fig. 9 Turn-off Time vs. Forward Current (White Package)**



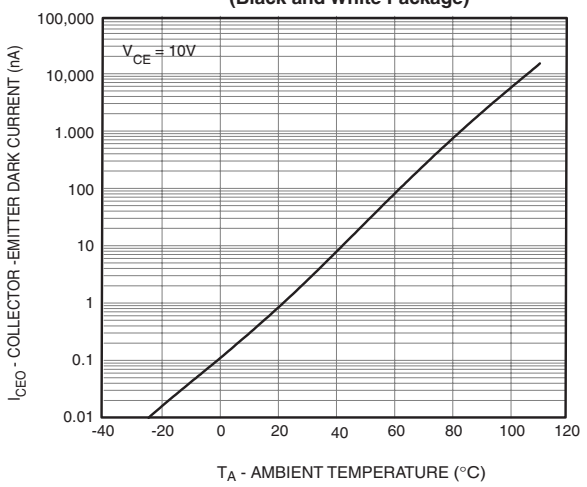
**Fig. 10 Normalized Collector-Emitter Current vs. Collector-Emitter Voltage (Black Package)**



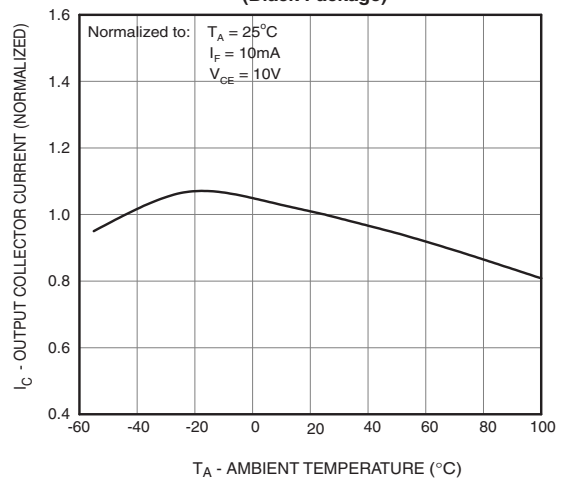
**Fig. 11 Normalized Collector-Emitter Current vs. Collector-Emitter Voltage (White Package)**



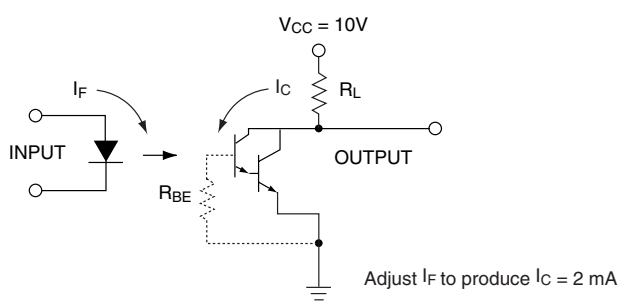
**Fig. 12 Dark Current vs. Ambient Temperature (Black and White Package)**



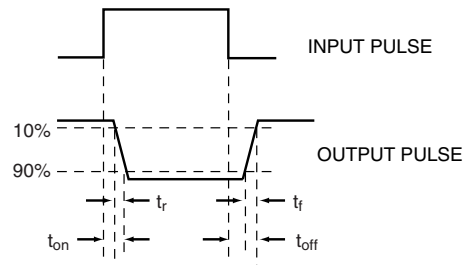
**Fig. 13 Output Current vs. Ambient Temperature (Black Package)**



**TEST CIRCUIT**



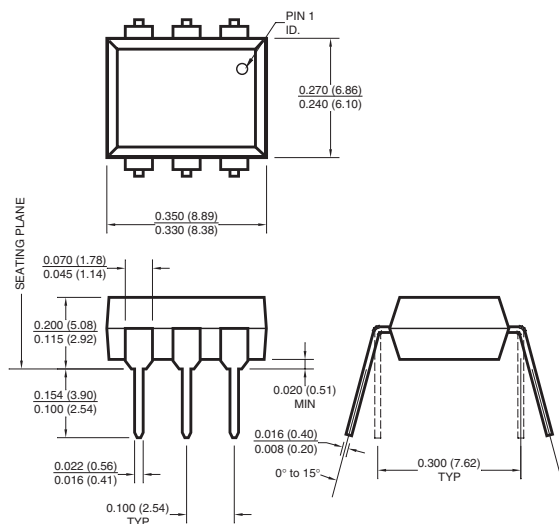
**WAVE FORMS**



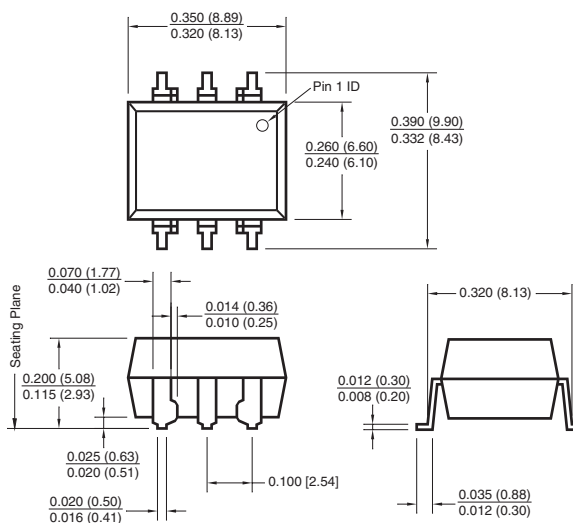
**Figure 14. Switching Time Test Circuit and Waveforms**

## Black Package (No -M Suffix)

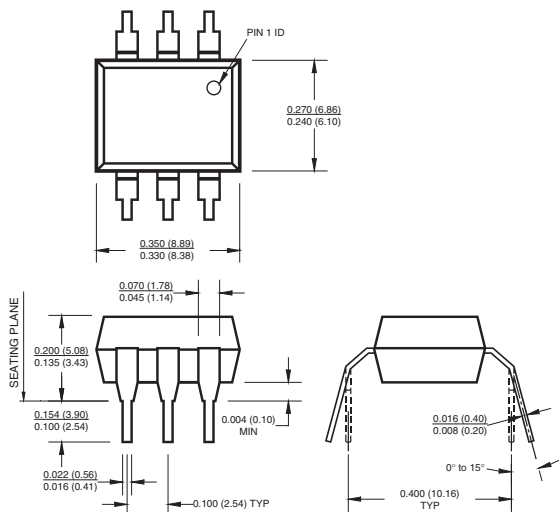
### Package Dimensions (Through Hole)



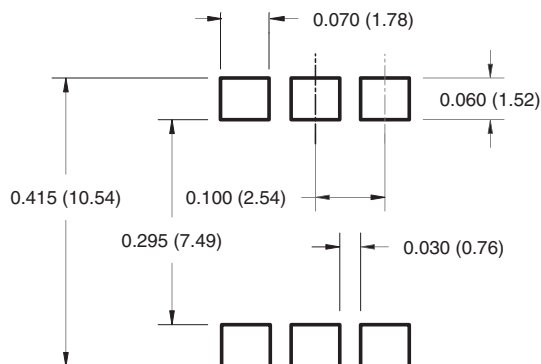
### Package Dimensions (Surface Mount)



### Package Dimensions (0.4" Lead Spacing)



### Recommended Pad Layout for Surface Mount Leadform

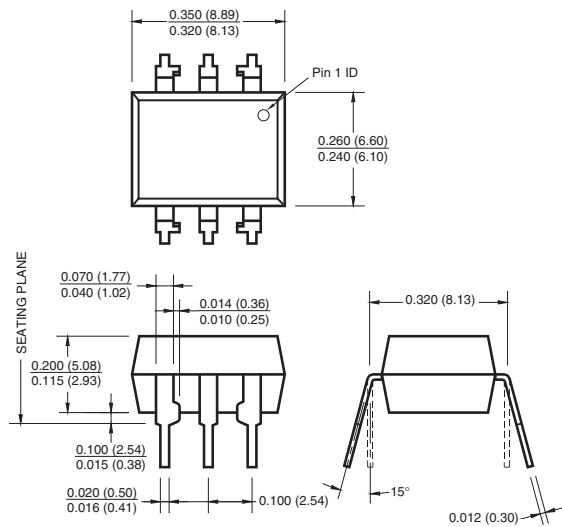


**Note:**

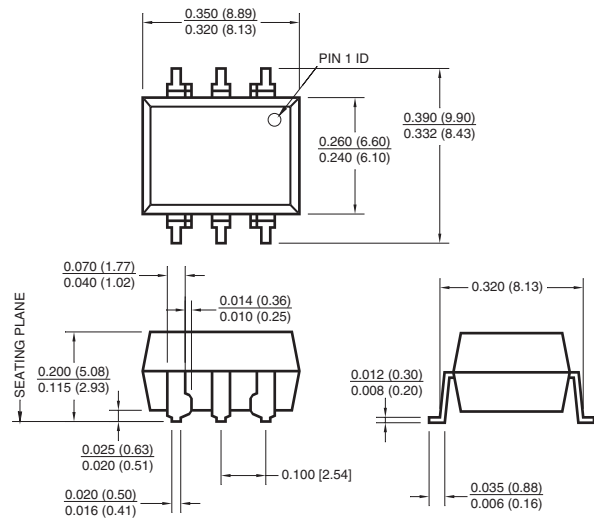
All dimensions are in inches (millimeters).

## White Package (-M Suffix)

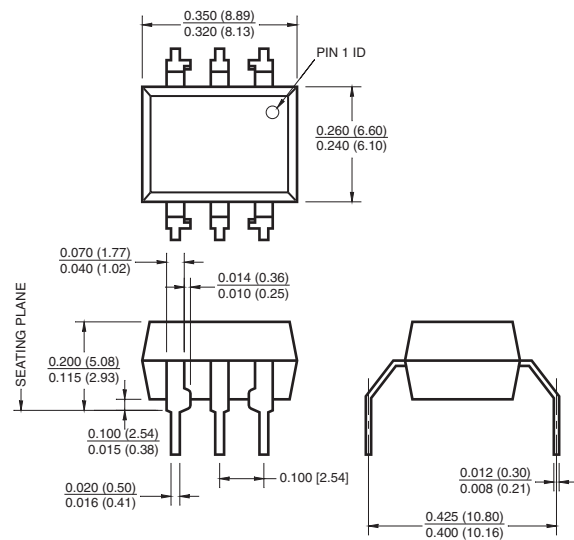
### Package Dimensions (Through Hole)



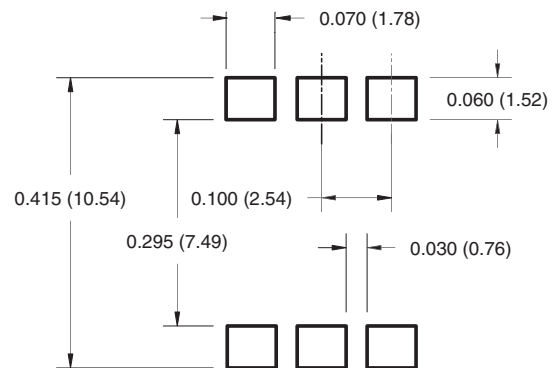
### Package Dimensions (Surface Mount)



### Package Dimensions (0.4" Lead Spacing)



### Recommended Pad Layout for Surface Mount Leadform



#### Note:

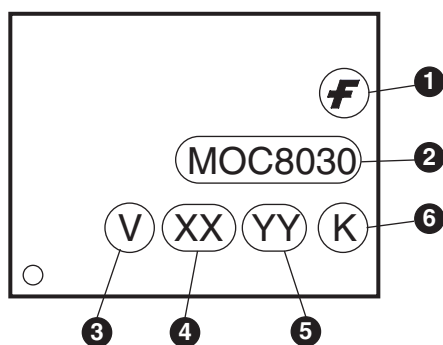
All dimensions are in inches (millimeters).



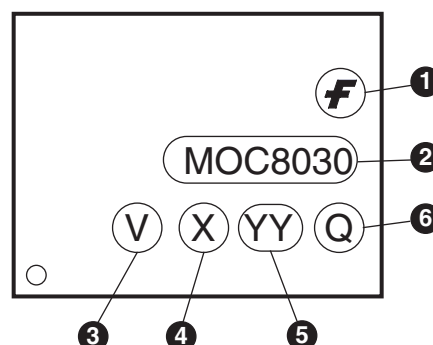
## Ordering Information

Black Package (No Suffix)	White Package (-M Suffix)	Option
.S	S	Surface Mount Lead Bend
.SD	SR2	Surface Mount; Tape and reel
.W	T	0.4" Lead Spacing
.300	V	VDE 0884
.300W	TV	VDE 0884, 0.4" Lead Spacing
.3S	SV	VDE 0884, Surface Mount
.3SD	SR2V	VDE 0884, Surface Mount, Tape & Reel

## Marking Information



**Black Package, No Suffix**

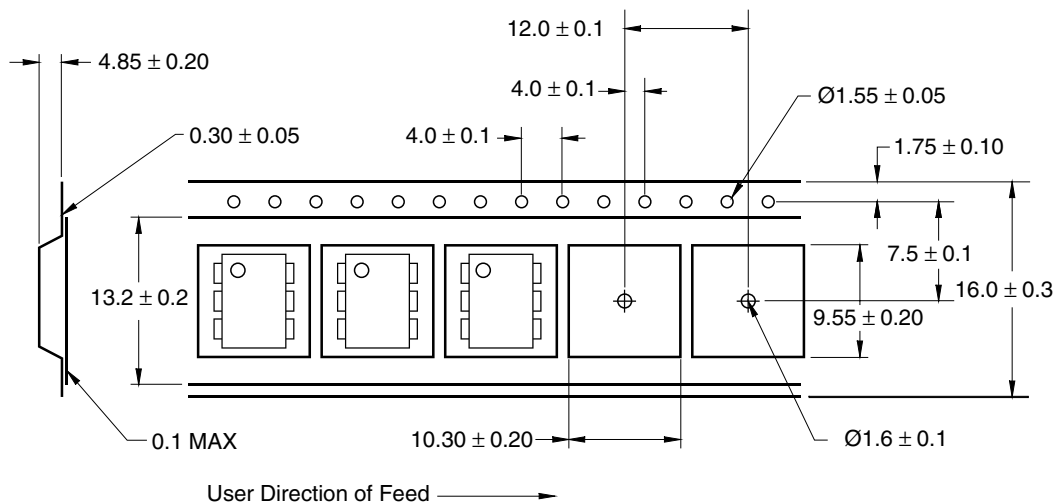


**White Package, -M Suffix**

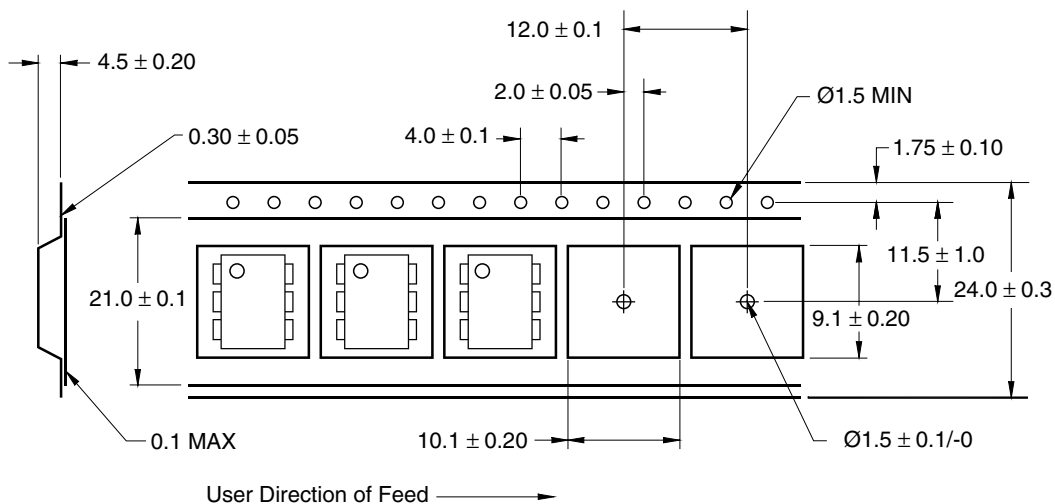
Definitions	
1	Fairchild logo
2	Device number
3	VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)
4	One or two digit year code <ul style="list-style-type: none"> <li>• Two digits for black package parts, e.g., '03'</li> <li>• One digit for white package parts, e.g., '3'</li> </ul>
5	Two digit work week ranging from '01' to '53'
6	Assembly package code

### Tape Dimensions

#### Black Package, No Suffix



#### White Package, -M Suffix

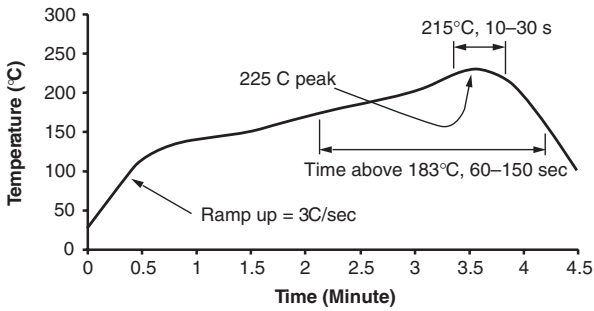


**Note:**

All dimensions are in millimeters.

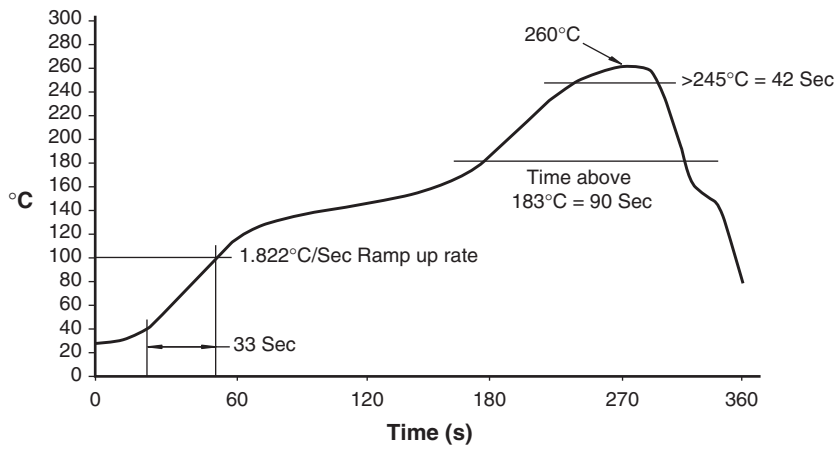
## Reflow Soldering Profile

### Black Package, No Suffix



- Peak reflow temperature: 225°C (package surface temperature)
- Time of temperature higher than 183°C for 60-150 seconds
- One time soldering reflow is recommended

### White Package, -M Suffix



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CoolFET™	I <sup>2</sup> C™	PACMAN™	SuperFET™	
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FASTr™	MicroPak™	QT Optoelectronics™	TinyPWM™	
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### PRODUCT STATUS DEFINITIONS

#### Definition of Terms

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.
Preliminary	First Production	This datasheet contains preliminary data, and 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.
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