FAIRCHILD SEMICONDUCTOR®

December 2006

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

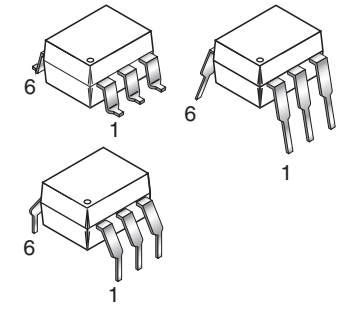
- Appliances, measuring instruments
- I/O interface for computers
- Programmable controllers
- Portable electronics
- Interfacing and coupling systems of different potentials and impedance
- Solid state relays

Description

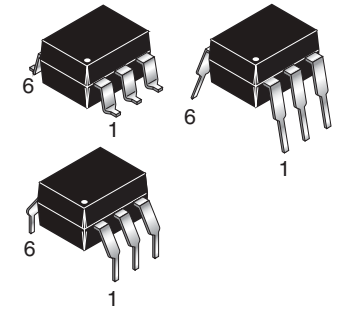
The MOC8030 and MOC8050 are photodarlington-type optically coupled optocouplers. The devices have a gallium arsenide infrared emitting diode coupled with a silicon darlington phototransistor.

Packages

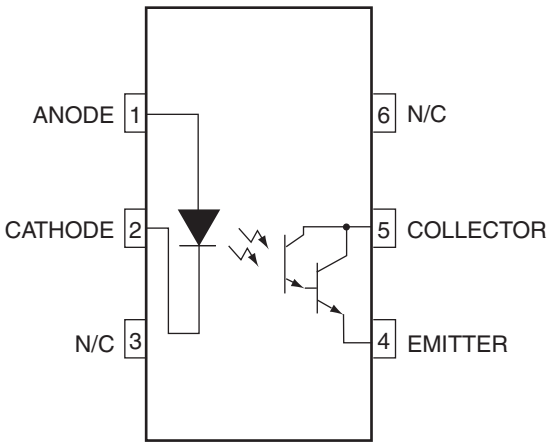
White Package (-M Suffix)



Black Package (No -M Suffix)



Schematic



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Absolute Maximum Ratings (T_A = 25°C Unless otherwise specified.)

Symbol	Parameter	Value	Units
TOTAL DEVICE			
T_{STG}	Storage Temperature	-40 to +150	°C
T_{OPR}	Operating Temperature	-40 to +110	°C
T_{SOL}	Lead Solder Temperature	260 for 10 sec	°C
P_D	Total Device Power Dissipation @ T_A = 25°C	250	mW
	Derate above 25°C	2.94	mW/°C
EMITTER			
I_F	DC/Average Forward Input Current	60	mA
V_R	Reverse Input Voltage	3	V
P_D	LED Power Dissipation @ T_A = 25°C	120	mW
	Derate above 25°C	1.41	mW/°C
DETECTOR			
V_{CEO}	Collector-Emitter Voltage	80	V
P_D	Detector Power Dissipation @ T_A = 25°C	150	mW
	Derate above 25°C	1.76	mW/°C
I_C	Continuous Collector Current	150	mA

Electrical Characteristics (T_A = 25°C Unless otherwise specified.)

Individual Component Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.*	Max.	Unit
EMITTER						
V_F	Input Forward Voltage	I_F = 10mA		1.18	2.00	V
I_R	Reverse Leakage Current	V_R = 3.0V		0.001	10	µA
DETECTOR						
BV_{CEO}	Collector-Emitter Breakdown Voltage	I_C = 1.0mA, I_F = 0	80	100		V
BV_{ECO}	Emitter-Collector Breakdown Voltage	I_E = 100µA, I_F = 0	5	10		V
I_{CEO}	Collector-Emitter Dark Current	V_{CE} = 60V, I_F = 0			1	µA
C_{CE}	Capacitance	V_{CE} = 0V, f = 1MHz		8		pF

Transfer Characteristics

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

Isolation Characteristics

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

Notes:

*Typical values at T_A = 25°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)

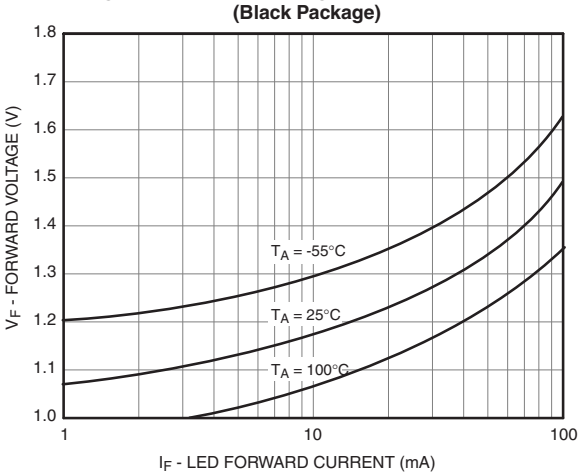


Fig. 2 LED Forward Voltage vs. Forward Current (White Package)

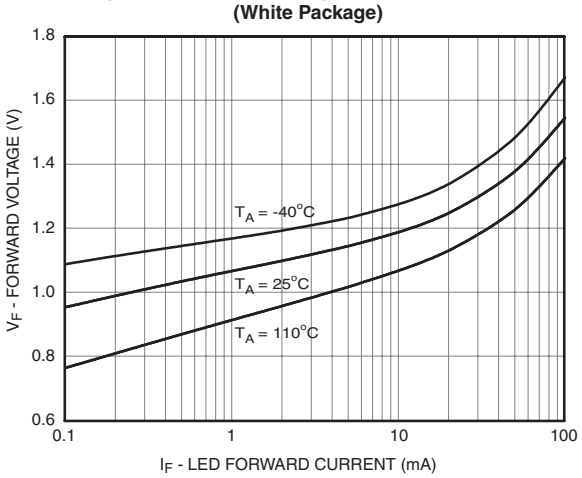


Fig. 3 Normalized CTR vs. Forward Current (Black Package)

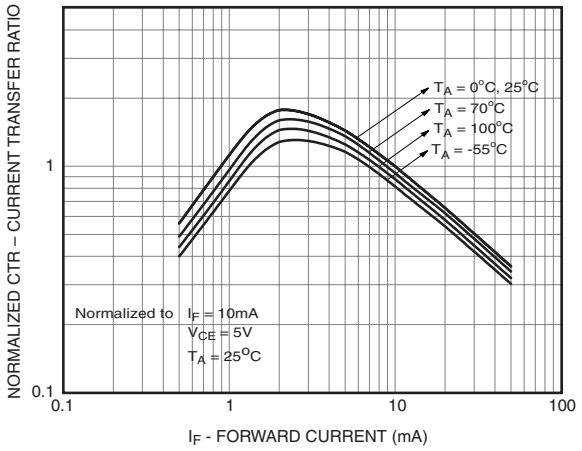


Fig. 4 Normalized CTR vs. Forward Current (White Package)

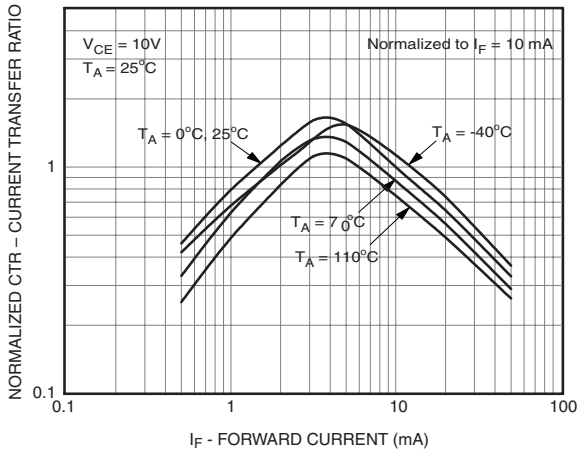
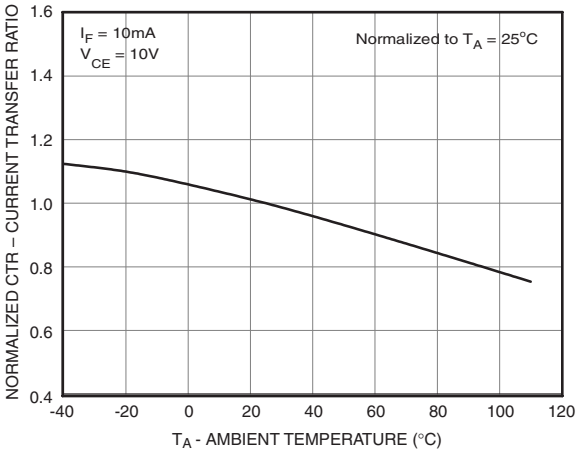


Fig. 5 Normalized CTR vs. Ambient Temperature (White Package)



Typical Performance Curves (Continued)

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

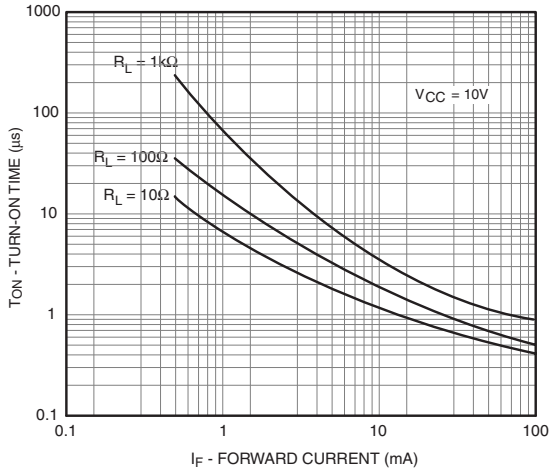


Fig. 7 Turn-on Time vs. Forward Current (White Package)

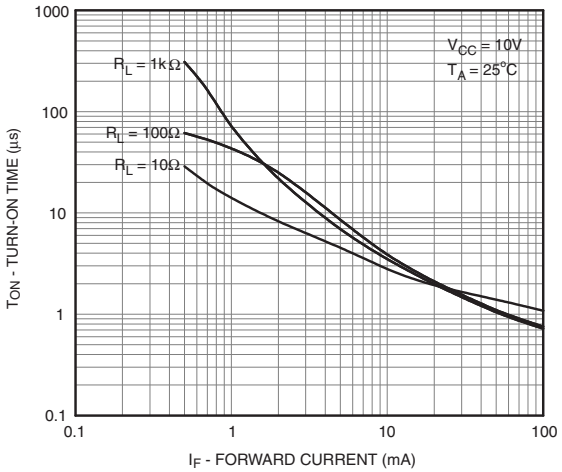


Fig. 8 Turn-off Time vs. Forward Current Black Package)

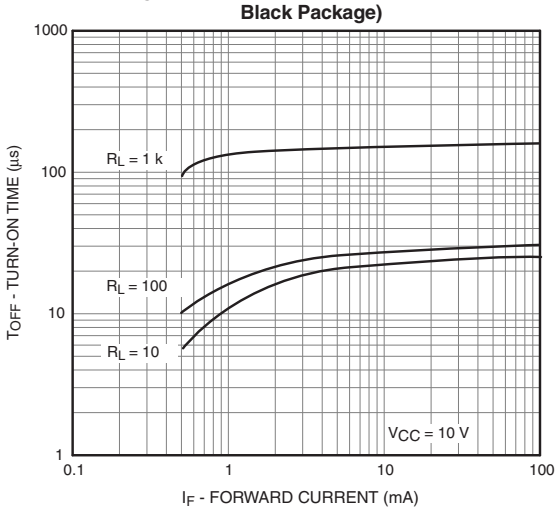


Fig. 9 Turn-off Time vs. Forward Current (White Package)

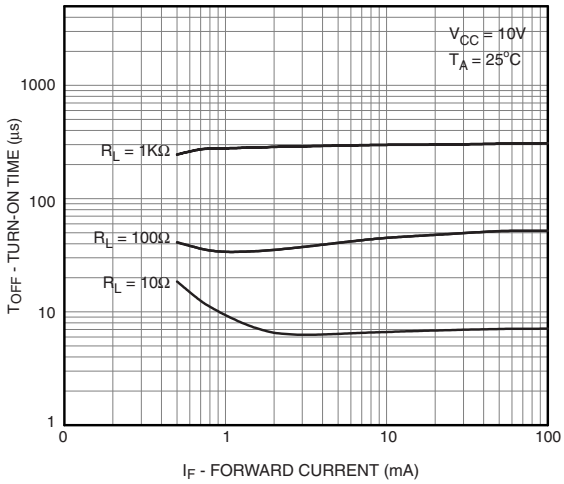


Fig. 10 Normalized Collector-Emitter Current vs. Collector-Emitter Voltage (Black Package)

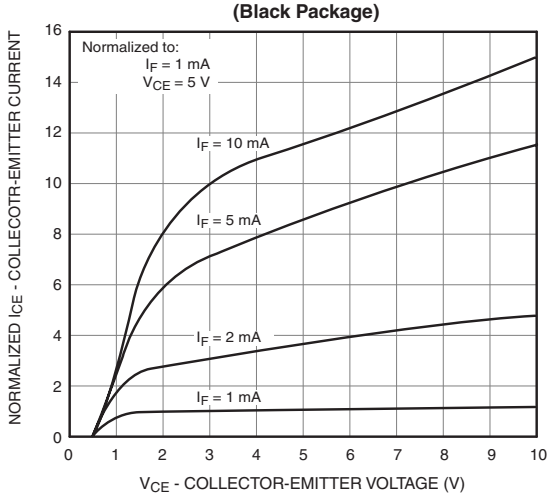


Fig. 11 Normalized Collector-Emitter Current vs. Collector-Emitter Voltage (White Package)

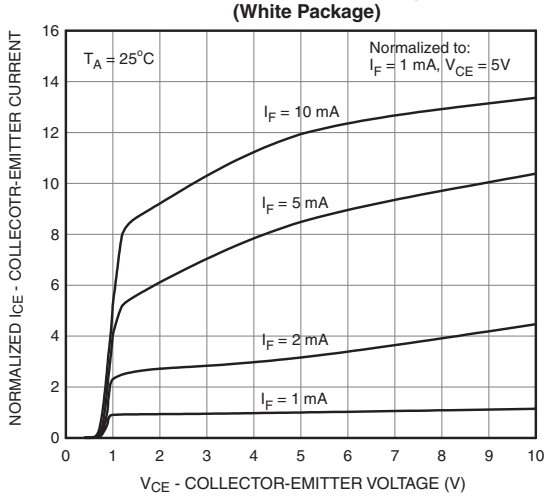


Fig. 12 Dark Current vs. Ambient Temperature (Black and White Package)

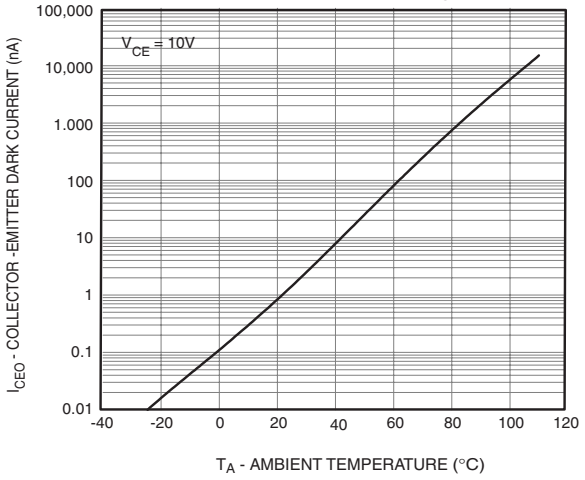
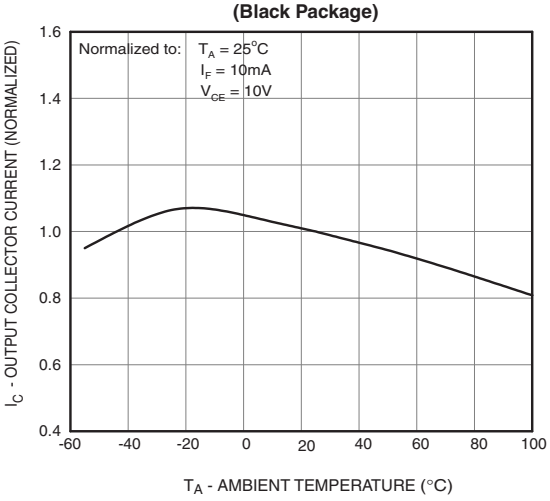
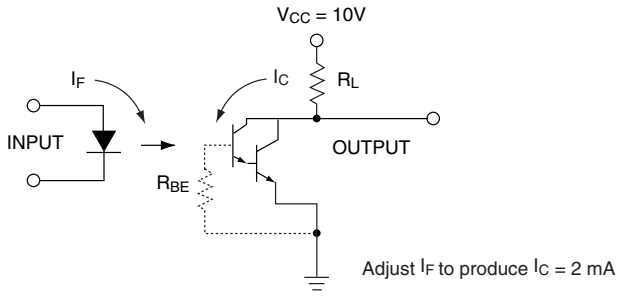


Fig. 13 Output Current vs. Ambient Temperature (Black Package)



TEST CIRCUIT



WAVE FORMS

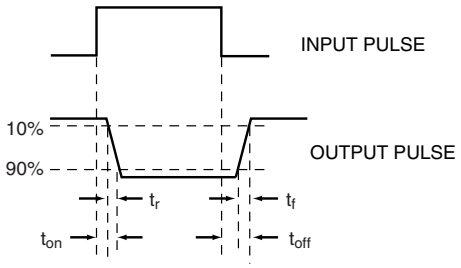
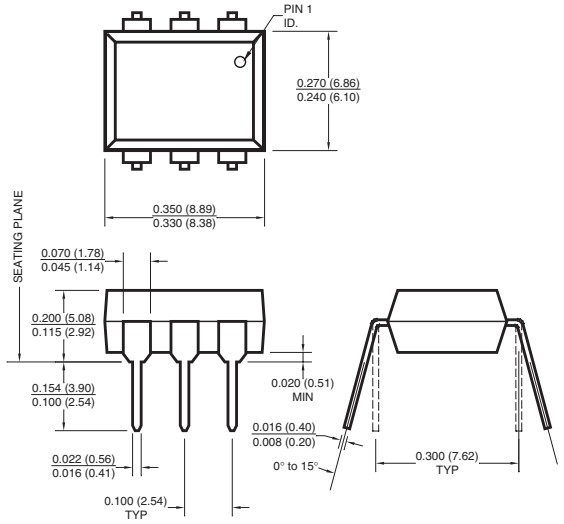


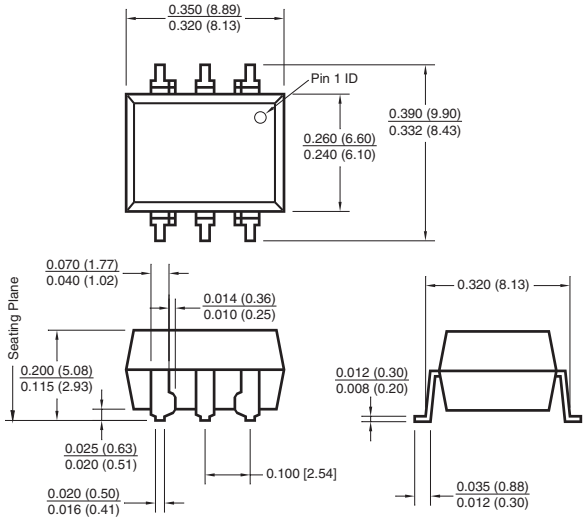
Figure 14. Switching Time Test Circuit and Waveforms

Black Package (No -M Suffix)

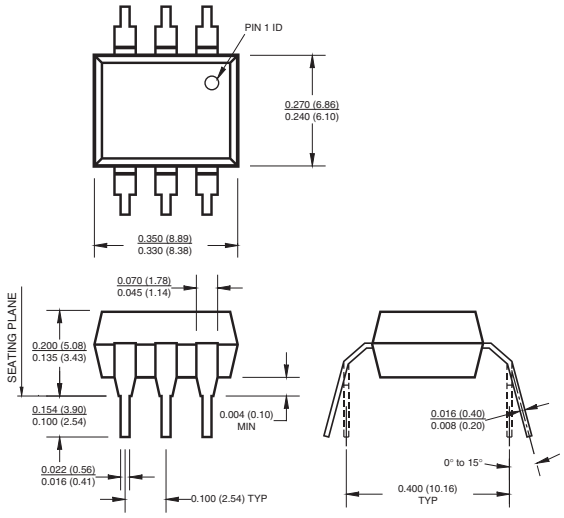
Package Dimensions (Through Hole)



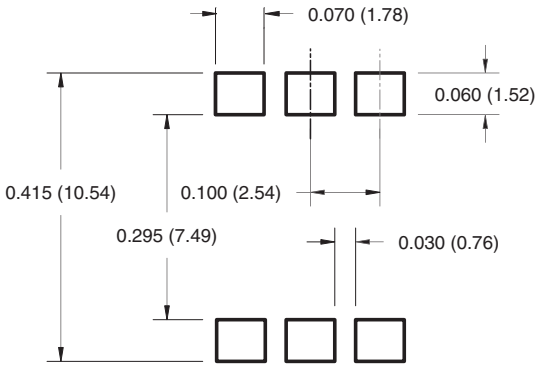
Package Dimensions (Surface Mount)



Package Dimensions (0.4” Lead Spacing)



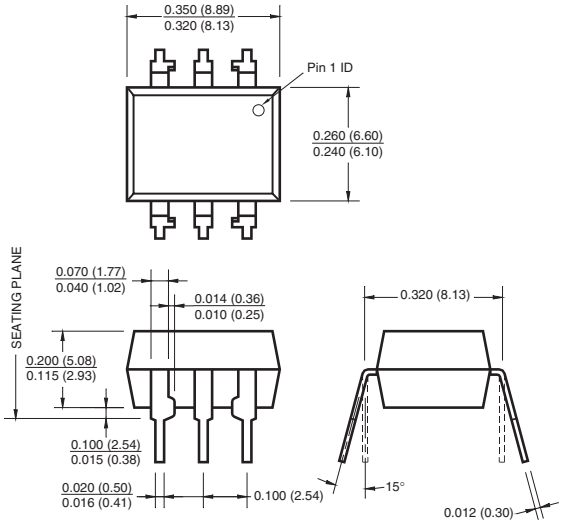
Recommended Pad Layout for Surface Mount Leadform



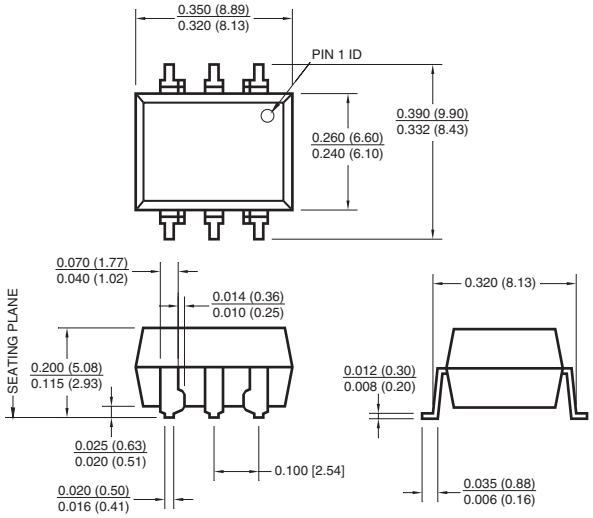
Note:
All dimensions are in inches (millimeters).

White Package (-M Suffix)

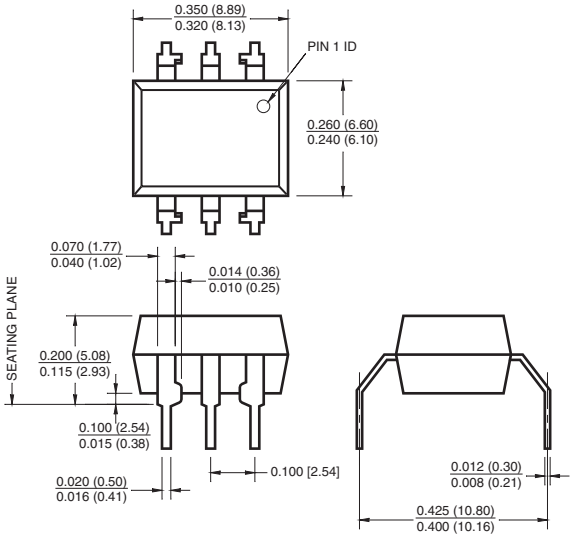
Package Dimensions (Through Hole)



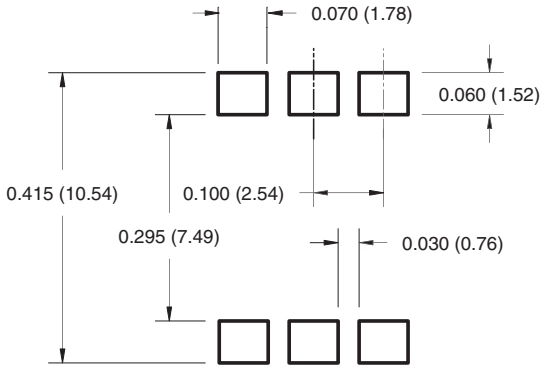
Package Dimensions (Surface Mount)



Package Dimensions (0.4” Lead Spacing)



Recommended Pad Layout for Surface Mount Leadform

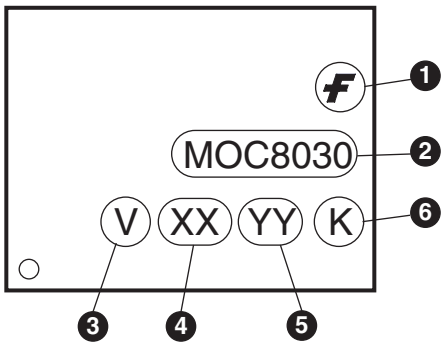


Note:
All dimensions are in inches (millimeters).

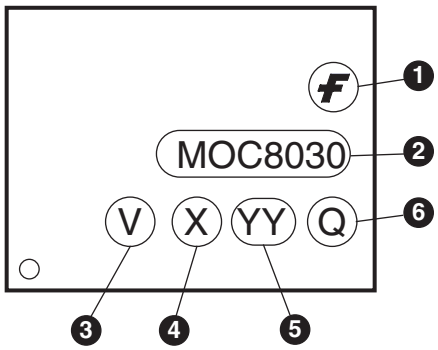
Ordering Information

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

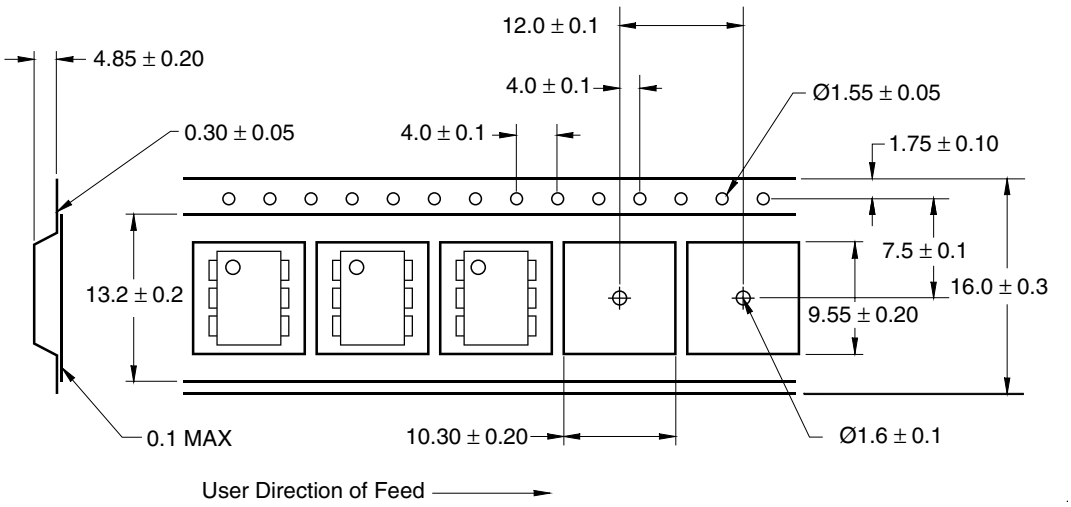


White Package, -M Suffix

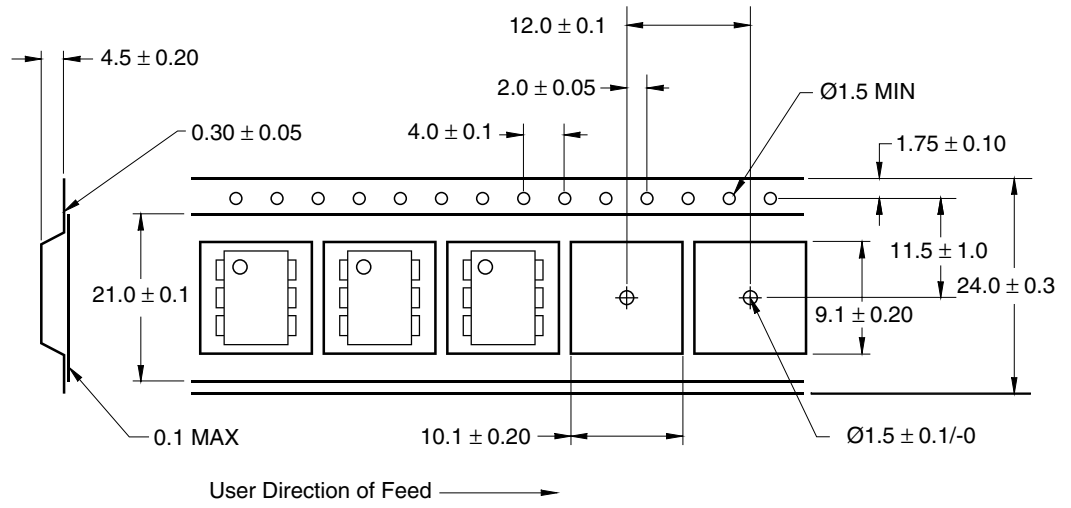
Definitions	
1	Fairchild logo
2	Device number
3	VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)
4	One or two digit year code • Two digits for black package parts, e.g., '03' • One digit for white package parts, e.g., '3'
5	Two digit work week ranging from '01' to '53'
6	Assembly package code

Tape Dimensions

Black Package, No Suffix



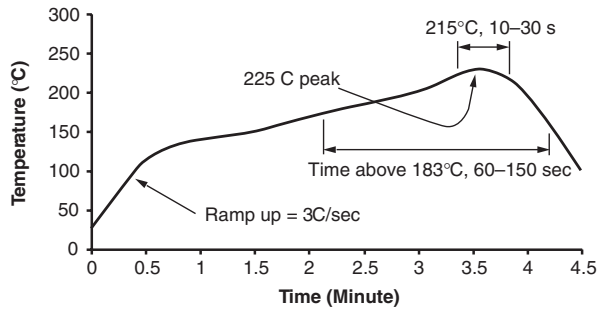
White Package, -M Suffix



Note:
All dimensions are in millimeters.

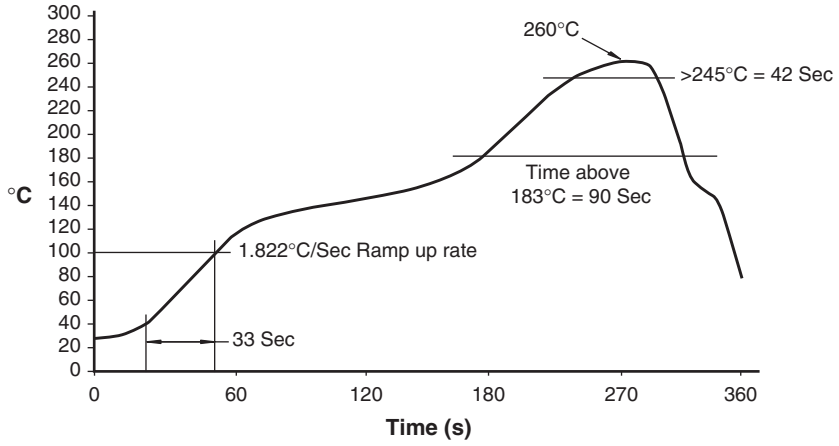
Reflow Soldering Profile

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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CROSSVOLT™	*i-Lo*™	POP™	SuperSOT™-3	
DOME™	ImpliedDisconnect™	Power247™	SuperSOT™-6	
EcoSPARK™	IntelliMAX™	PowerEdge™	SuperSOT™-8	
E^2CMOS™	ISOPLANAR™	PowerSaver™	SyncFET™	
EnSigna™	LittleFET™	PowerTrench®	TCM™	
FACT®	MICROCOUPLER™	QFET®	TinyBoost™	
FAST®	MicroFET™	QS™	TinyBuck™	
FASTr™	MicroPak™	QT Optoelectronics™	TinyPWM™	
FPS™	MICROWIRE™	Quiet Series™	TinyPower™	
FRFET™	MSX™	RapidConfigure™	TinyLogic®	
	MSXPro™	RapidConnect™	TINYOPTO™	
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The Power Franchise®		ScalarPump™	UHC®	
Programmable Active Droop™				

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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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.
No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.

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