

# MOCD223-M Dual Channel Phototransistor Small Outline Surface Mount Optocouplers

## Features

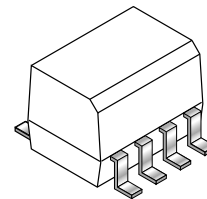
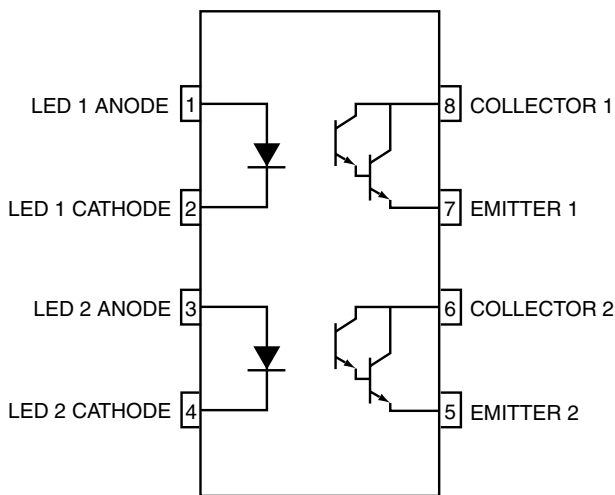
- U.L. Recognized (File #E90700, Volume 2)
- VDE Recognized (File #13616) (add option "V" for VDE approval, i.e., MOCD223V-M)
- Convenient Plastic SOIC-8 Surface Mountable Package Style
- High Current Transfer Ratio of 500% Minimum at  $I_F = 1\text{mA}$
- Minimum  $BV_{CEO}$  of 30 Volts Guaranteed
- Standard SOIC-8 Footprint, with 0.050" Lead Spacing
- Compatible with Dual Wave, Vapor Phase and IR Reflow Soldering
- High Input-Output Isolation Voltage of 2500  $V_{AC(rms)}$  Guaranteed

## Applications

- Interfacing and coupling systems of different potentials and impedances
- General purpose switching circuits
- Monitor and detection circuits

## Description

The MOCD223-M consist of two gallium arsenide infrared emitting diodes optically coupled to two monolithic silicon phototransistor darlington detectors, in a surface mountable, small outline plastic package. It is ideally suited for high density applications that require low input current and eliminates the need for through-the-board mounting.



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

Symbol	Rating	Value	Unit
<b>EMITTER</b>			
$I_F$	Forward Current – Continuous	60	mA
$I_F$ (pk)	Forward Current – Peak (PW = 100 $\mu$ s, 120pps)	1.0	A
$V_R$	Reverse Voltage	6.0	V
$P_D$	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
$V_{CBO}$	Collector-Base Voltage	70	V
$V_{ECO}$	Emitter-Collector 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 <sup>(1,2,3)</sup> (f = 60Hz, t = 1 min. Duration)	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	$^\circ\text{C}$
$T_L$	Lead Soldering Temperature (1/16" from case, 10 sec. duration)	260	$^\circ\text{C}$

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

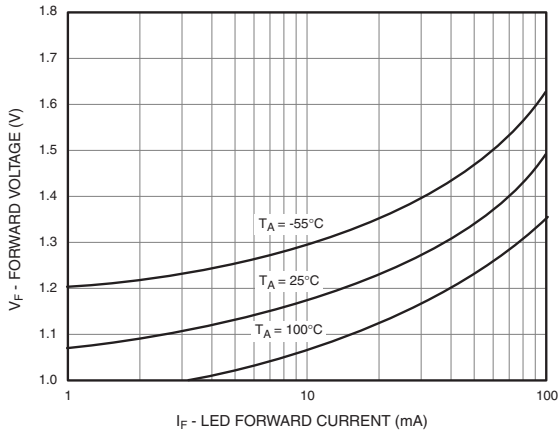
Symbol	Parameter	Test Conditions	Min.	Typ.*	Max.	Unit
<b>EMITTER</b>						
$V_F$	Input Forward Voltage	$I_F = 1.0\text{mA}$		1.25	1.3	V
$I_R$	Reverse Leakage Current	$V_R = 6.0\text{V}$		0.001	100	$\mu\text{A}$
$C_{IN}$	Capacitance			18		pF
<b>DETECTOR</b>						
$I_{CEO1}$	Collector-Emitter Dark Current	$V_{CE} = 5.0\text{V}, T_A = 25^\circ\text{C}$		1.0	50	nA
$I_{CEO2}$		$V_{CE} = 5.0\text{V}, T_A = 100^\circ\text{C}$		1.0		$\mu\text{A}$
$BV_{CEO}$	Collector-Emitter Breakdown Voltage	$I_C = 100\mu\text{A}$	30	90		V
$BV_{ECO}$	Emitter-Collector Breakdown Voltage	$I_E = 100\mu\text{A}$	7.0	10		V
$C_{CE}$	Collector-Emitter Capacitance	$f = 1.0\text{MHz}, V_{CE} = 0$		5.5		pF
<b>COUPLED</b>						
CTR	Collector-Output Current <sup>(4)</sup>	$I_F = 1.0\text{mA}, V_{CE} = 5\text{V}$	500	1000		%
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 500\mu\text{A}, I_F = 1.0\text{mA}$			1.0	V
$t_{on}$	Turn-On Time	$I_F = 5.0\text{mA}, V_{CC} = 10\text{V}, R_L = 100\Omega$ (Fig 6.)		8		$\mu\text{s}$
$t_{off}$	Turn-Off Time	$I_F = 5.0\text{mA}, V_{CC} = 10\text{V}, R_L = 100\Omega$ (Fig 6.)		55		$\mu\text{s}$
$t_r$	Rise Time	$I_F = 5.0\text{mA}, V_{CC} = 10\text{V}, R_L = 100\Omega$ (Fig 6.)		6		$\mu\text{s}$
$t_f$	Fall Time	$I_F = 5.0\text{mA}, V_{CC} = 10\text{V}, R_L = 100\Omega$ (Fig 6.)		45		$\mu\text{s}$
$V_{ISO}$	Isolation Surge Voltage <sup>(1,2,3)</sup>	$f = 60\text{Hz}, t = 1 \text{ min.}$	2500			$V_{ac(rms)}$
$R_{ISO}$	Isolation Resistance <sup>(2)</sup>	$V_{I-O} = 500\text{V}$	$10^{11}$			$\Omega$
$C_{ISO}$	Isolation Capacitance <sup>(2)</sup>	$V_{I-O} = 0\text{V}, f = 1 \text{ MHz}$		0.2		pF

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

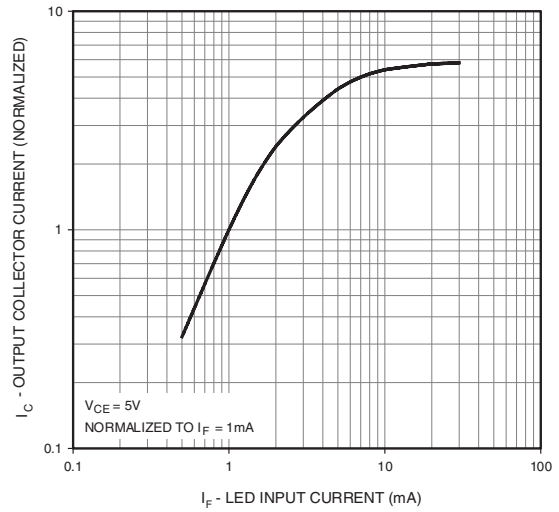
1. Isolation Surge Voltage,  $V_{ISO}$ , is an internal device dielectric breakdown rating.
2. For this test, Pins 1, 2, 3 and 4 are common and Pins 5, 6, 7 and 8 are common.
3.  $V_{ISO}$  rating of 2500  $V_{AC(rms)}$  for  $t = 1 \text{ min.}$  is equivalent to a rating of 3,000  $V_{AC(rms)}$  for  $t = 1 \text{ sec.}$
4. Current Transfer Ratio (CTR) =  $I_C / I_F \times 100\%$ .

## Typical Performance Curves

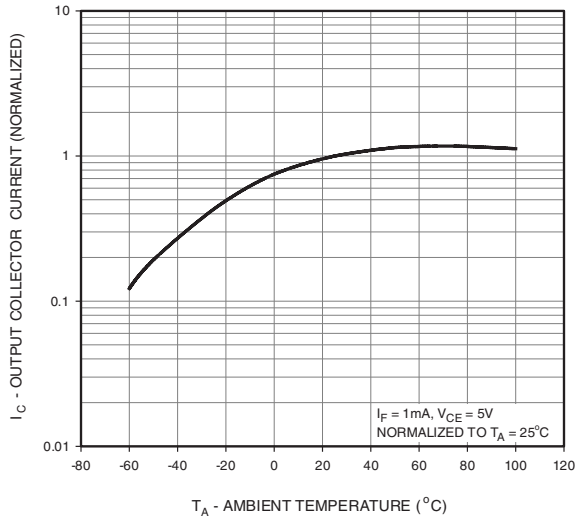
**Fig. 1 LED Forward Voltage vs. Forward Current**



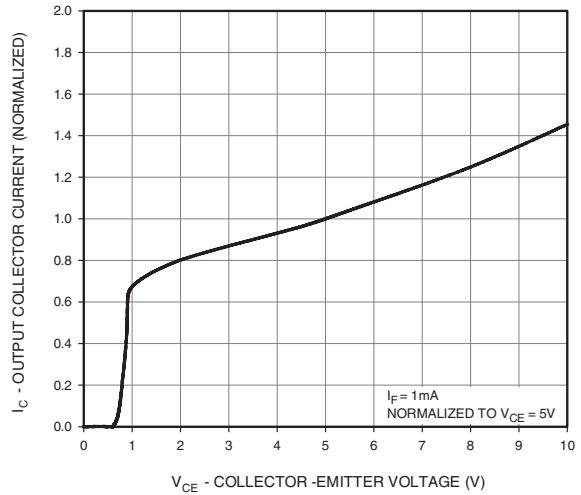
**Fig. 2 Output Current vs. Input Current**



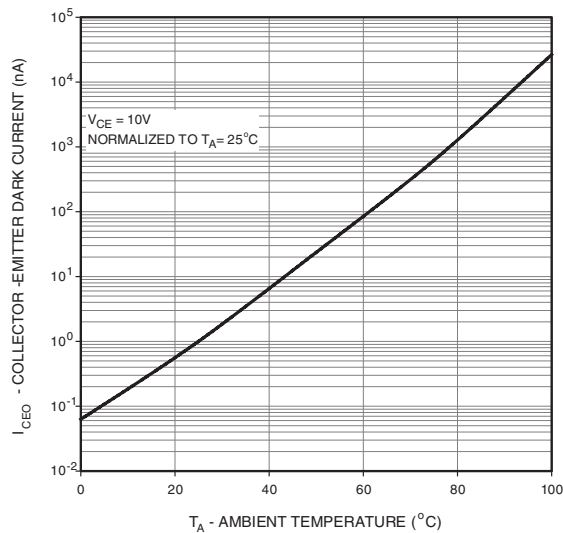
**Fig. 3 Output Current vs. Ambient Temperature**



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



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



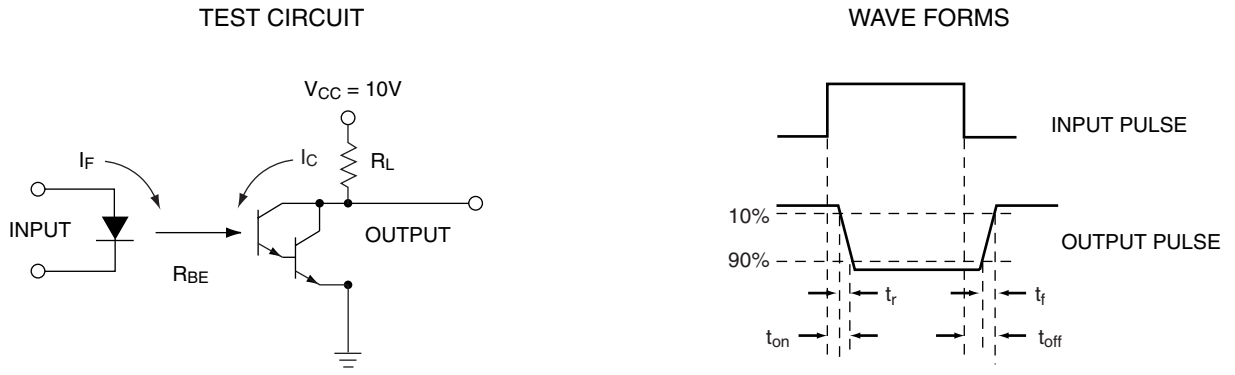
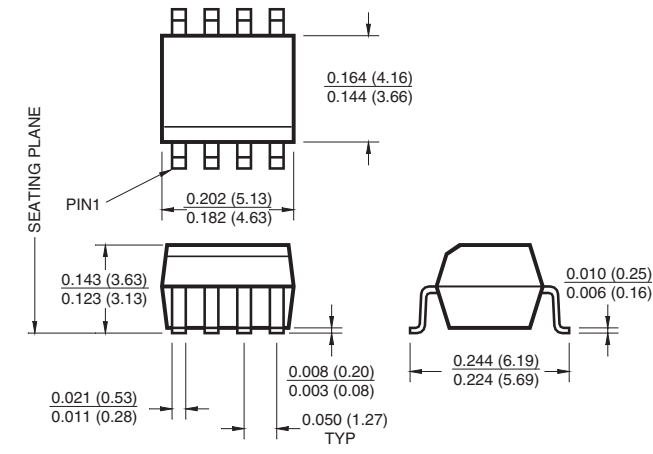


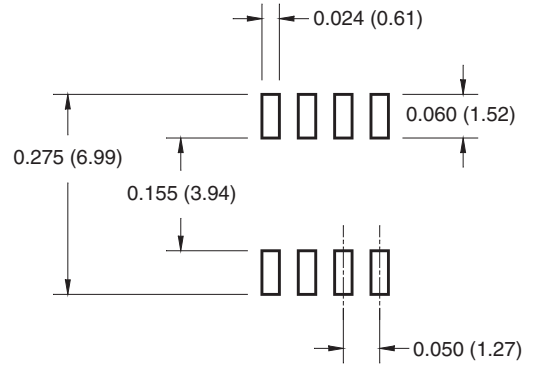
Figure 6. Switching Time Test Circuit and Waveforms

## Package Dimensions

### Surface Mount



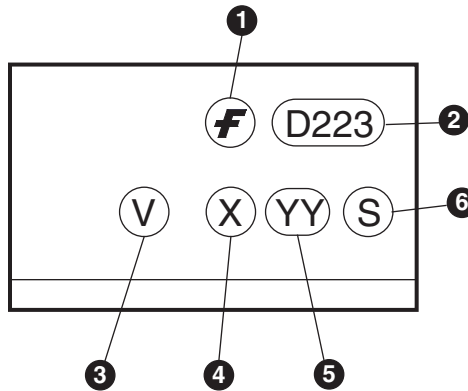
### 8-Pin Small Outline



### Ordering Information

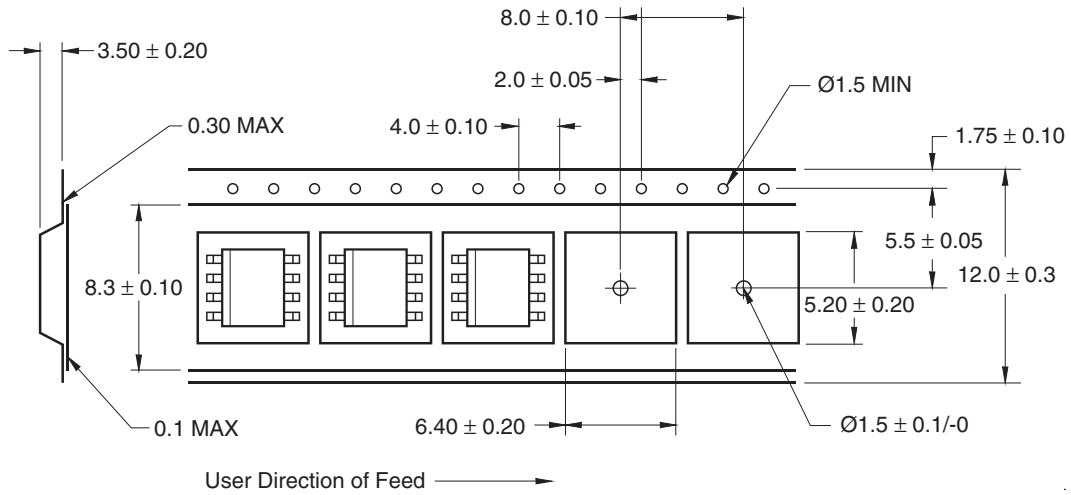
Option	Order Entry Identifier	Description
V	V	VDE 0884
R1	R1	Tape and reel (500 units per reel)
R1V	R1V	VDE 0884, Tape and reel (500 units per reel)
R2	R2	Tape and reel (2500 units per reel)
R2V	R2V	VDE 0884, Tape and reel (2500 units per reel)

### Marking Information

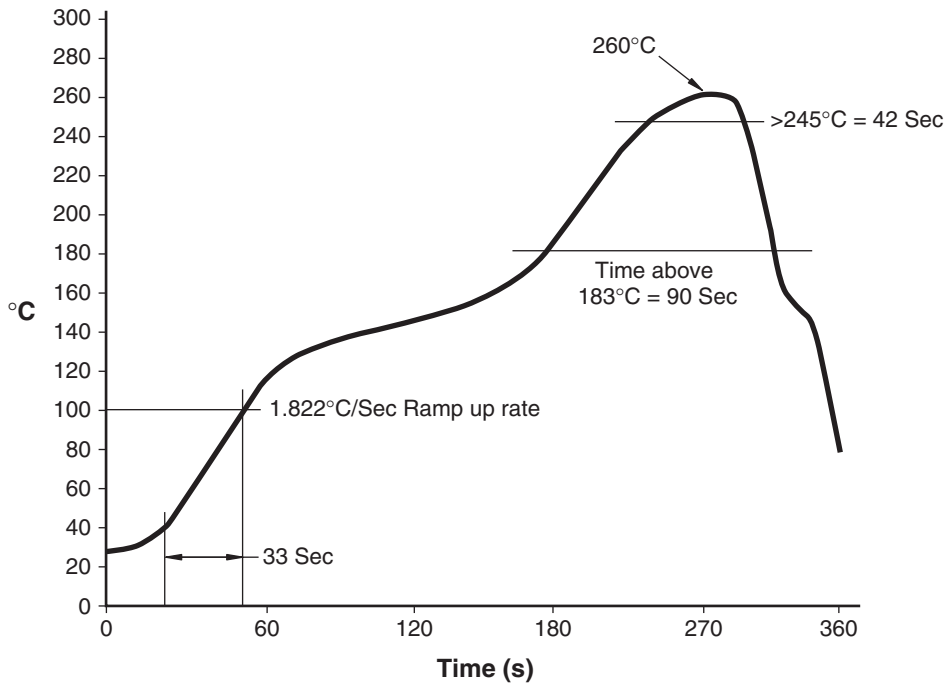


Definitions	
1	Fairchild logo
2	Device number
3	VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)
4	One digit year code, e.g., '3'
5	Two digit work week ranging from '01' to '53'
6	Assembly package code

### Carrier Tape Specifications



### Reflow Profile





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Build it Now™	HiSeC™	OPTOPLANAR™	Stealth™	Wire™
CoolFET™	I <sup>2</sup> C™	PACMAN™	SuperFET™	
CROSSVOLT™	i-Lo™	POP™	SuperSOT™-3	
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E <sup>2</sup> C MOS™	ISOPLANAR™	PowerSaver™	SyncFET™	
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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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Programmable Active Droop™				

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## PRODUCT STATUS DEFINITIONS

### Definition of Terms

Datasheet Identification	Product Status	Definition
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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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