

MOC223-M

Small Outline Optocouplers Darlington Output

Features

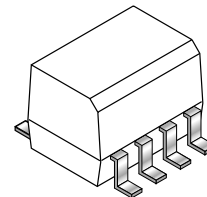
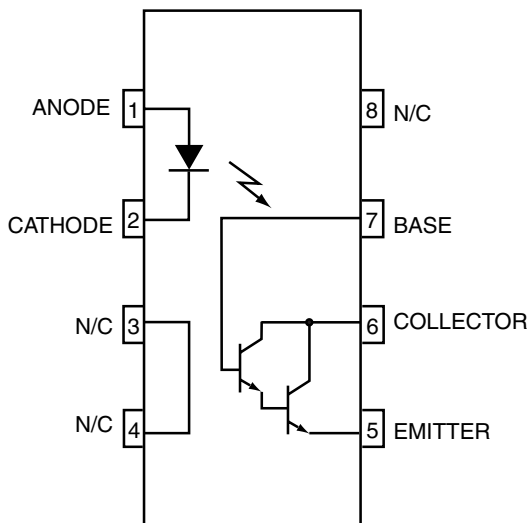
- U.L. Recognized (File #E90700, Volume 2)
- VDE Recognized (File #136616) (add option "V" for VDE approval, i.e. MOC223V-M)
- Industry Standard SOIC-8 Surface Mountable Package with 0.050" lead spacing
- High Current Transfer Ratio of 500% Minimum at $I_F = 1\text{mA}$
- Standard SOIC-8 Footprint, with 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

- Low power logic circuits
- Interfacing and coupling systems of different potentials and impedances
- Telecommunications equipment
- Portable electronics
- Solid state relays

Description

The MOC223-M consists of a gallium arsenide infrared emitting diode optically coupled to a monolithic silicon photodarlington detector, in a surface mountable, small outline, plastic package. It is ideally suited for high density applications, 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
EMITTER			
I_F	Forward Current – Continuous	60	mA
I_F (pk)	Forward Current – Peak (PW = 100 μ 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°C	90	mW
		0.8	mW/ $^\circ\text{C}$
DETECTOR			
V_{CEO}	Collector-Emitter Voltage	30	V
V_{ECO}	Emitter-Collector Voltage	7.0	V
V_{CBO}	Collector-Base Voltage	70	V
I_C	Collector Current-Continuous	150	mA
P_D	Detector Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	150	mW
		1.76	mW/ $^\circ\text{C}$
TOTAL DEVICE			
V_{ISO}	Input-Output Isolation Voltage (f = 60Hz, t = 1 min.)	2500	Vac(rms)
P_D	Total Device Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°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
EMITTER						
V_F	Input Forward Voltage	$I_F = 1.0\text{mA}$		1.08	1.3	V
I_R	Reverse Leakage Current	$V_R = 6.0\text{V}$		0.001	100	μA
C_{IN}	Input Capacitance			18		pF
DETECTOR						
I_{CE01}	Collector-Emitter Dark Current	$V_{CE} = 5.0\text{V}, T_A = 25^\circ\text{C}$		1.0	50	nA
I_{CE02}		$V_{CE} = 5.0\text{V}, T_A = 100^\circ\text{C}$		10		μA
BV_{CEO}	Collector-Emitter Breakdown Voltage	$I_C = 100\mu\text{A}$	30	100		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
COUPLED						
CTR	Current Transfer Ratio ⁽³⁾	$I_F = 1.0\text{mA}, V_{CE} = 5.0\text{V}$	500	1000		%
V_{ISO}	Isolation Surge Voltage ^(1,2)	$f = 60\text{Hz AC Peak}, t = 1\text{min.}$	2500			Vac(rms)
R_{ISO}	Isolation Resistance ⁽²⁾	$V = 500\text{V}$	10^{11}			Ω
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 500\mu\text{A}, I_F = 1.0\text{mA}$			1.0	V
C_{ISO}	Isolation Capacitance ⁽²⁾	$V_{I-O} = 0\text{V}, f = 1\text{MHz}$		0.2		pF
t_{on}	Turn-On Time	$I_F = 5.0\text{mA}, V_{CC} = 10\text{V}, R_L = 100\Omega$ (Fig. 6)		10		μs
t_{off}	Turn-Off Time	$I_F = 5.0\text{mA}, V_{CC} = 10\text{V}, R_L = 100\Omega$ (Fig. 6)		125		ns
t_r	Rise Time	$I_F = 5.0\text{mA}, V_{CC} = 10\text{V}, R_L = 100\Omega$ (Fig. 6)		8		μs
t_f	Fall Time	$I_F = 5.0\text{mA}, V_{CC} = 10\text{V}, R_L = 100\Omega$ (Fig. 6)		110		μs

*All typicals 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 and 2 are common and Pins 5, 6 and 7 are common.
3. Current Transfer Ratio (CTR) = $I_C / I_F \times 100\%$.

Typical Performance Curves

Fig. 1 LED Forward Voltage vs. Forward Current

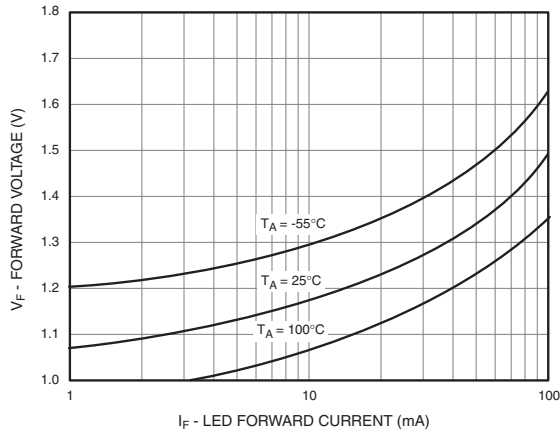


Fig. 2 Output Current vs. Input Current

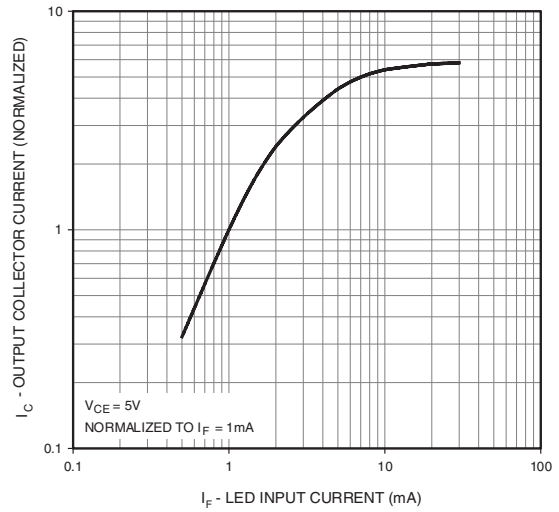


Fig. 3 Output Current vs. Ambient Temperature

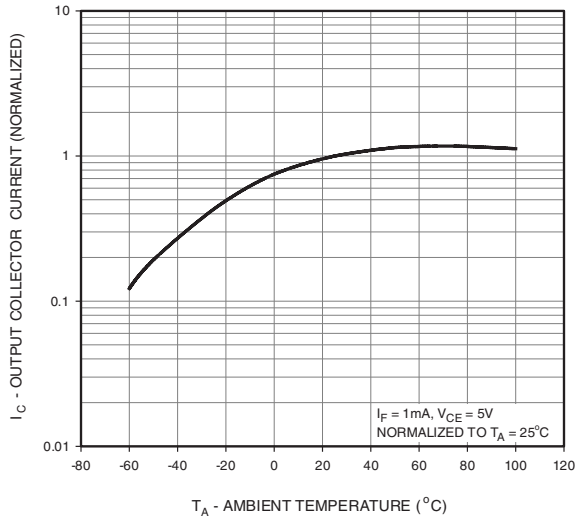


Fig. 4 Output Current vs. Collector - Emitter Voltage

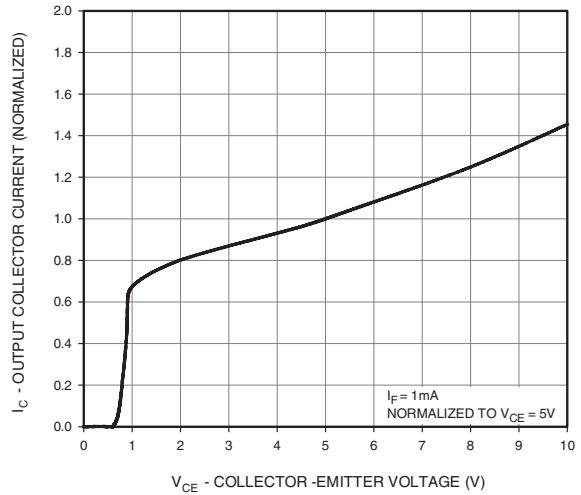
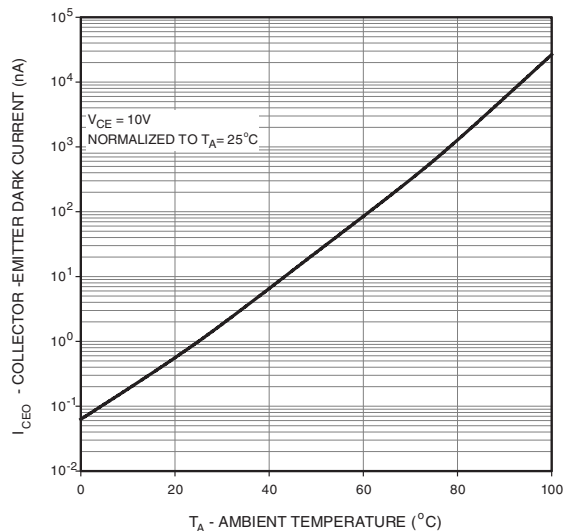


Fig. 5 Dark Current vs. Ambient Temperature



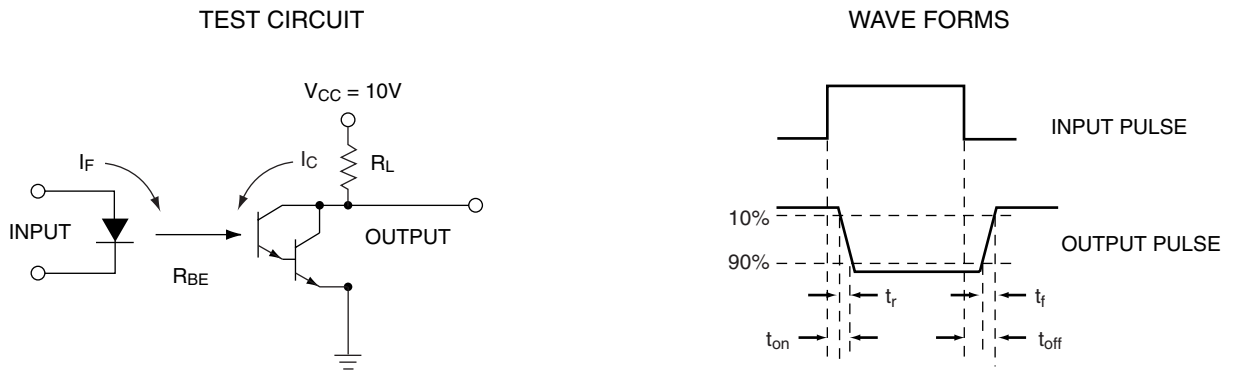
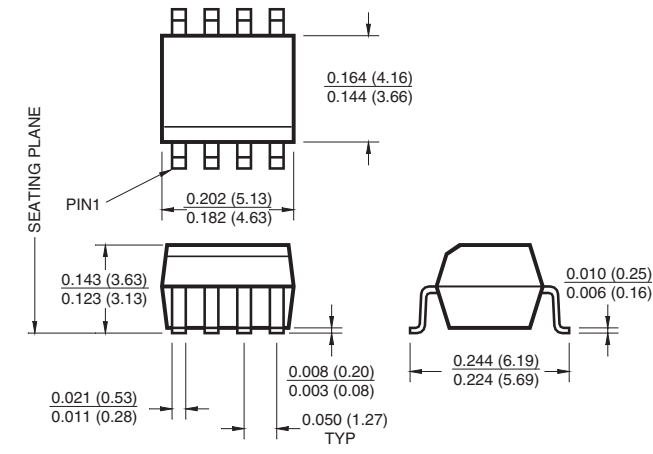


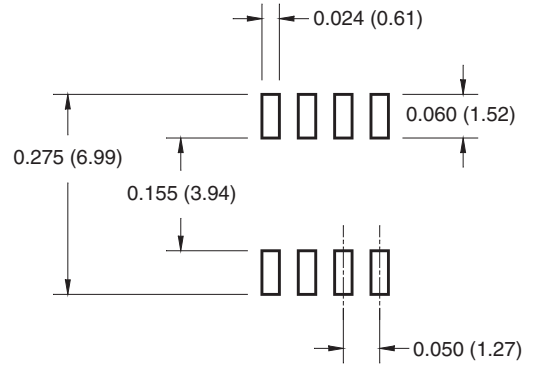
Figure 6. Switching Time Test Circuit and Waveforms

Package Dimensions

Surface Mount



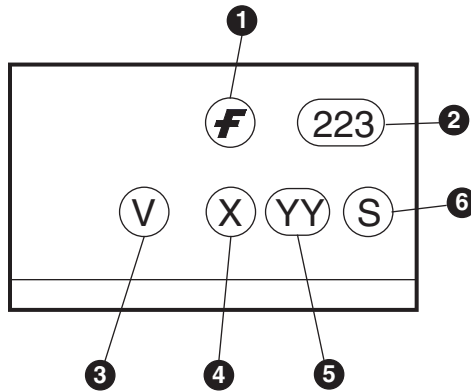
8-Pin Small Outline



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)

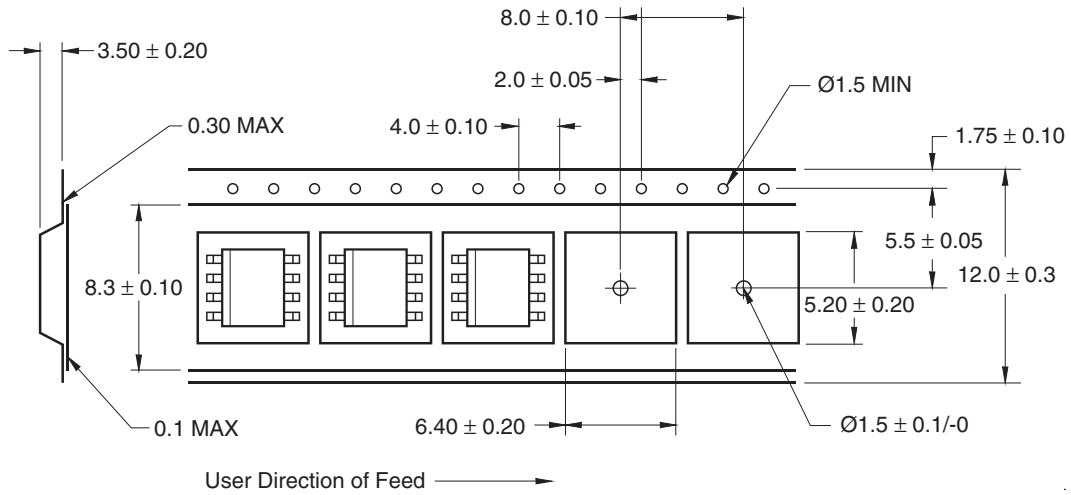
Marking Information



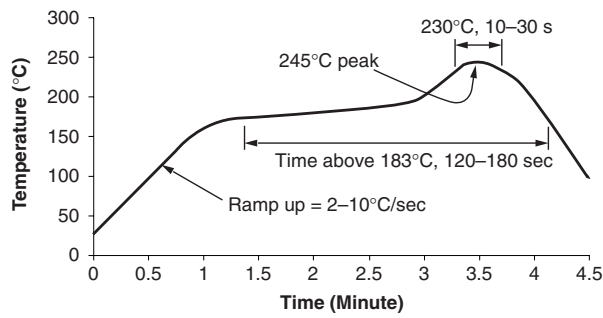
Definitions	
1	Fairchild logo
2	Device number
3	VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)
4	One digit year code, e.g., '3'
5	Two digit work week ranging from '01' to '53'
6	Assembly package code

*Note – 'V' option parts marked with date code '325' or earlier are marked in portrait format.

Carrier Tape Specifications



Reflow Profile



- Peak reflow temperature: 245°C (package surface temperature)
- Time of temperature higher than 183°C for 120–180 seconds
- One time soldering reflow is recommended

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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.
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Rev. 120



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Наши контакты:

Телефон: +7 812 627 14 35

Электронная почта: sales@st-electron.ru

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