

8-pin SOIC Darlington Output Optocouplers

MOC223M, MOCD223M

Description

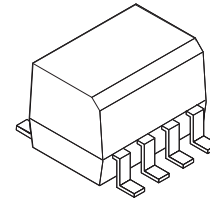
The MOC223M consists of a gallium arsenide infrared emitting diode optically coupled to a monolithic silicon photodarlington detector, in a surface mountable, small outline, plastic package. The MOCD223M is a dual-channel version of the MOC223M. They are ideally suited for high density applications, and eliminates the need for through the board mounting.

Features

- High Current Transfer Ratio of 500% Minimum at $I_F = 1 \text{ mA}$
- Minimum BV_{CEO} of 30 V Guaranteed
- Convenient Plastic SOIC-8 Surface Mountable Package Style, with 0.050" Lead Spacing
- Safety and Regulatory Approvals:
 - ♦ UL2688, 2,500 $V_{AC_{RMS}}$ for 1 Minute
 - ♦ DIN-EN/IEC60747-5-5, 565 V Peak Working Insulation Voltage
- These Devices are Pb-Free and Halogen Free

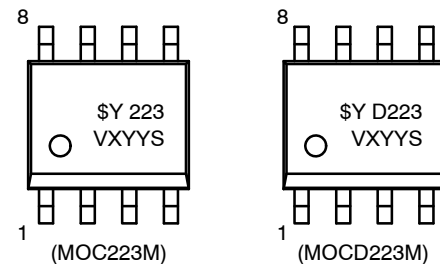
Applications

- Low Power Logic Circuits
- Interfacing and Coupling Systems of Different Potentials and Impedances
- Telecommunications Equipment
- Portable Electronics
- Solid State Relays



SOIC8
CASE 751DZ

MARKING DIAGRAMS



\$Y	= onsemi Logo
223/D223	= Specific Device Code
V	= DIN EN/IEC60747-5-5 Option
X	= One-Digit Year Code
YY	= Digit Work Week
S	= Assembly Package Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 7 of this data sheet.

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SCHEMATICS

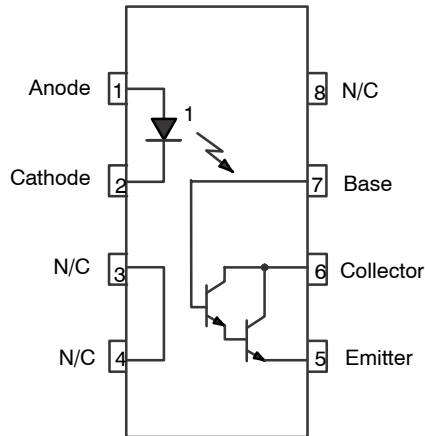


Figure 1. Schematic – MOC223M

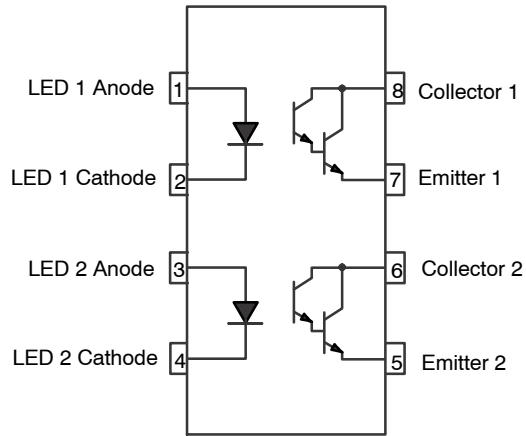


Figure 2. Schematic – MOCD223M

SAFETY AND INSULATION RATINGS

Parameter		Characteristics
Installation Classifications per DIN VDE 0110/1.89 Table 1, For Rated Mains Voltage	< 150 V _{RMS}	I–IV
	< 300 V _{RMS}	I–III
Climatic Classification		55/100/21
Pollution Degree (DIN VDE 0110/1.89)		2
Comparative Tracking Index		175

Symbol	Parameter	Value	Unit
V _{PR}	Input-to-Output Test Voltage, Method A, V _{IORM} × 1.6 = V _{PR} , Type and Sample Test with t _m = 10 s, Partial Discharge < 5 pC	904	V _{peak}
	Input-to-Output Test Voltage, Method B, V _{IORM} × 1.875 = V _{PR} , 100% Production Test with t _m = 1 s, Partial Discharge < 5 pC	1060	
V _{IORM}	Maximum Working Insulation Voltage	565	
V _{IOTM}	Highest Allowable Over-Voltage	4000	
	External Creepage	≥ 4	mm
	External Clearance	≥ 4	
DTI	Distance Through Insulation (Insulation Thickness)	≥ 0.4	
T _S	Case Temperature (Note 1)	150	°C
I _{S,INPUT}	Input Current (Note 1)	200	mA
P _{S,OUTPUT}	Output Power (Note 1)	300	mW
R _{IO}	Insulation Resistance at T _S , V _{IO} = 500 V (Note 1)	> 10 ⁹	Ω

As per DIN EN/IEC 60747–5–5, this optocoupler is suitable for “safe electrical insulation” only within the safety limit data. Compliance with the safety ratings shall be ensured by means of protective circuits.

1. Safety limit values – maximum values allowed in the event of a failure.

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ABSOLUTE MAXIMUM RATINGS $T_A = 25^\circ\text{C}$ unless otherwise specified.

Symbol	Parameter	Value	Unit
TOTAL DEVICE			
T_{STG}	Storage Temperature	-40 to +125	$^\circ\text{C}$
T_A	Ambient Operating Temperature	-40 to +100	
T_J	Junction Temperature	-40 to +125	
T_{SOL}	Lead Solder Temperature	260 for 10 s	
P_D	Total Device Power Dissipation @ $T_A = 25^\circ\text{C}$	240	mW
	Derate Above 25°C	2.94	mW/ $^\circ\text{C}$

EMITTER

I_F	Continuous Forward Current	60	mA
$I_F(\text{pk})$	Forward Current – Peak (PW = 100 μs , 120 pps)	1.0	A
V_R	Reverse Voltage	6.0	V
P_D	LED Power Dissipation @ $T_A = 25^\circ\text{C}$	90	mW
	Derate Above 25°C	0.8	mW/ $^\circ\text{C}$

DETECTOR

I_C	Continuous Collector Current	150	mA
V_{CEO}	Collector–Emitter Voltage	30	V
V_{CBO}	Collector–Base Voltage, MOC223M	70	
V_{ECO}	Emitter–Collector Voltage	7	
P_D	Detector Power Dissipation @ $T_A = 25^\circ\text{C}$	150	mW
	Derate Above 25°C	1.76	mW/ $^\circ\text{C}$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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_{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	–	μA
BV_{CEO}	Collector–Emitter Breakdown Voltage	$I_C = 100\text{ }\mu\text{A}$	30	100	–	V
BV_{CBO}	Collector–Base Breakdown Voltage	$I_C = 100\text{ }\mu\text{A}$	70	120	–	
BV_{ECO}	Emitter–Collector Breakdown Voltage	$I_E = 100\text{ }\mu\text{A}$	7	10	–	
C_{CE}	Collector–Emitter Capacitance	$f = 1.0\text{ MHz}, V_{CE} = 0$	–	5.5	–	pF

COUPLED

CTR	Current Transfer Ratio	$I_F = 1.0\text{ mA}, V_{CE} = 5.0\text{ V}$	500	1000	–	%
$V_{CE(\text{sat})}$	Collector–Emitter Saturation Voltage	$I_C = 500\text{ }\mu\text{A}, I_F = 1.0\text{ mA}$	–	–	1.0	V
t_{on}	Turn–On Time	$I_F = 5.0\text{ mA}, V_{CC} = 10\text{ V}, R_L = 100\text{ }\Omega$ (Figure 8)	–	10	–	μs
t_{off}	Turn–Off Time		–	55	–	
t_r	Rise Time		–	8	–	
t_f	Fall Time		–	45	–	

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ELECTRICAL CHARACTERISTICS $T_A = 25^\circ\text{C}$ unless otherwise specified. (continued)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
ISOLATION CHARACTERISTICS						
V_{ISO}	Input-Output Isolation Voltage	$t = 1 \text{ min}$	2500	–	–	V_{ACRMS}
C_{ISO}	Isolation Capacitance	$V_{\text{I-O}} = 0, f = 1 \text{ MHz}$	–	0.2	–	pF
R_{ISO}	Isolation Resistance	$V_{\text{I-O}} = \pm 500 V_{\text{DC}}, T_A = 25^\circ\text{C}$	10^{11}	–	–	Ω

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

TYPICAL PERFORMANCE CURVES

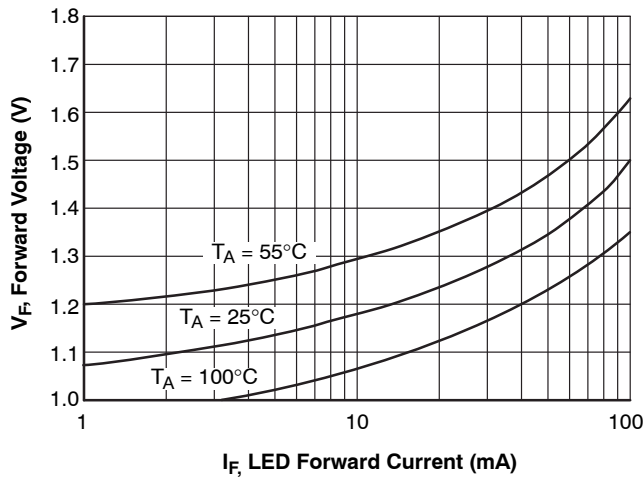


Figure 3. LED Forward Voltage vs. Forward Current

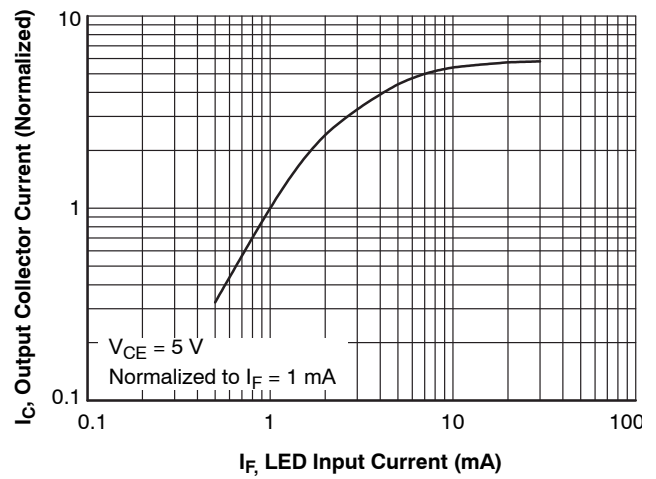


Figure 4. Output Current vs. Input Current

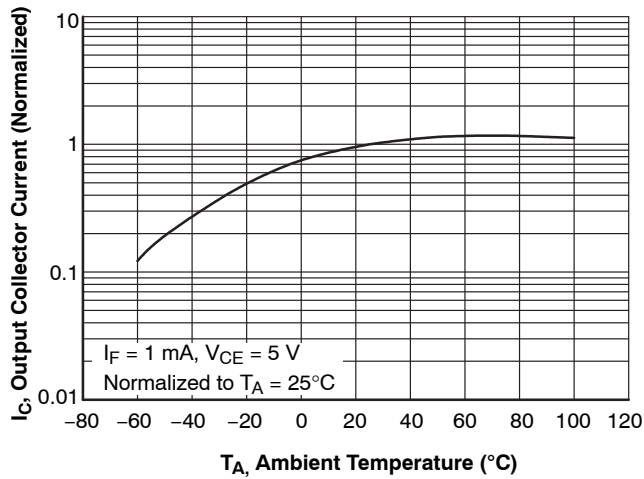


Figure 5. LED Forward Voltage vs. Forward Current

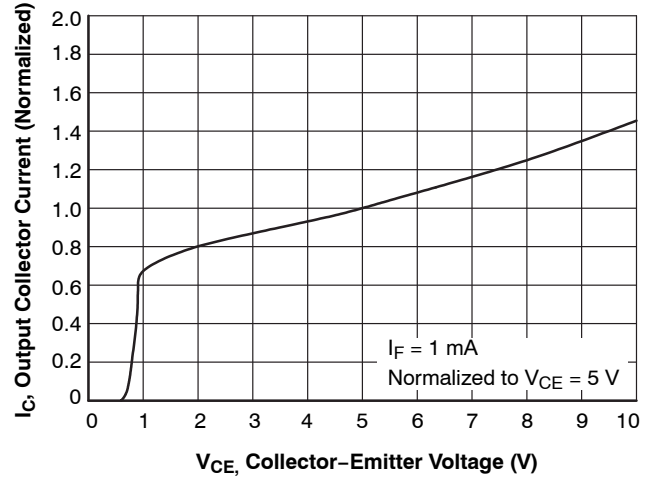


Figure 6. Output Current vs. Collector-Emitter Voltage

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TYPICAL PERFORMANCE CURVES

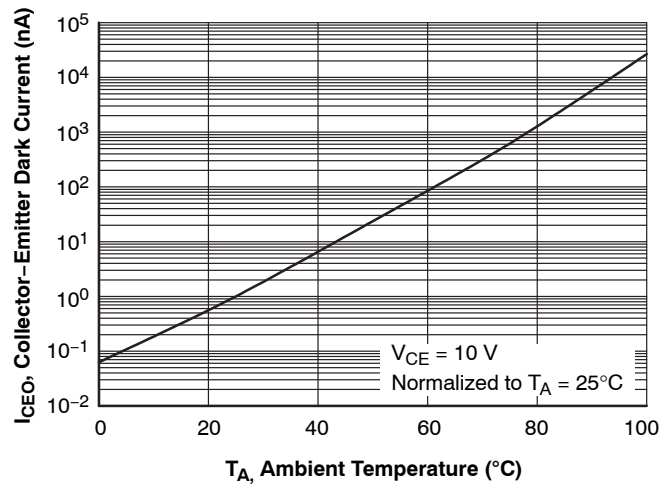


Figure 7. Dark Current vs. Ambient Temperature

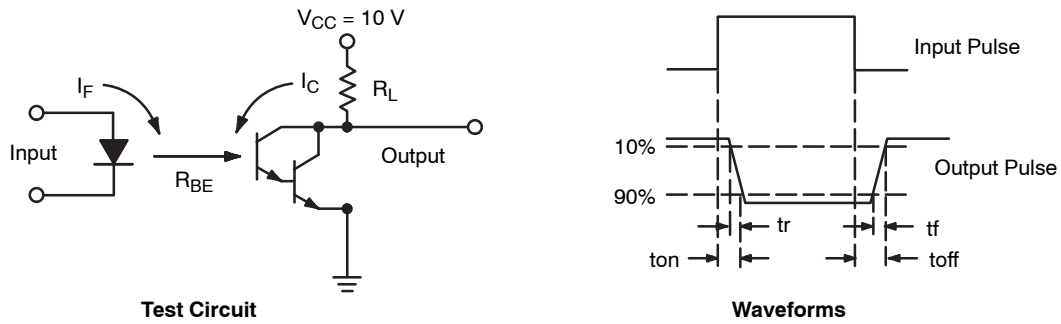


Figure 8. Switching Time Test Circuit and Waveforms

REFLOW PROFILE

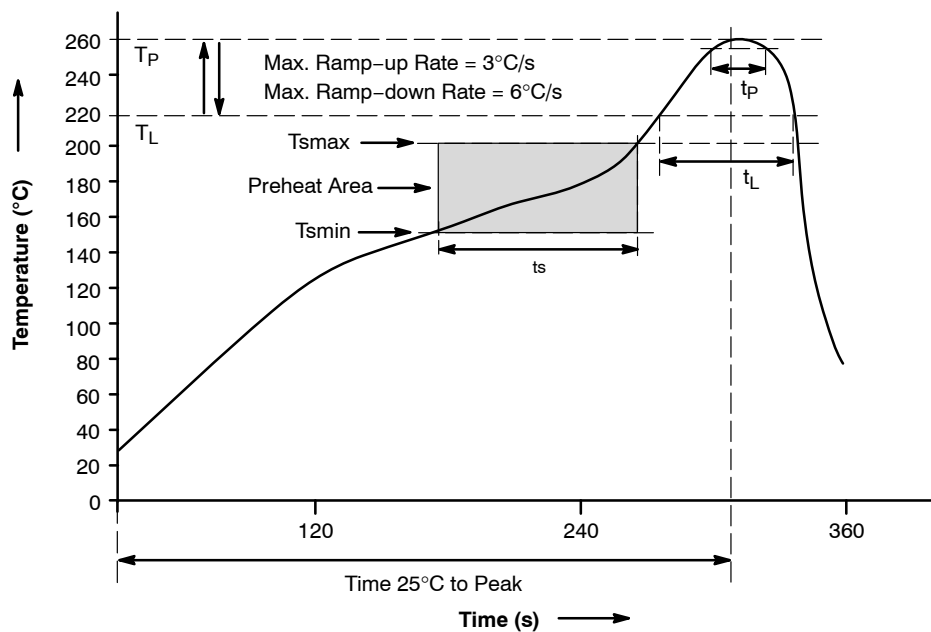


Figure 9. Reflow Profile

REFLOW PROFILE

Profile Feature	Pb-Free Assembly Profile
Temperature Min. (T_{smin})	150°C
Temperature Max. (T_{smax})	200°C
Time (t_s) from (T_{smin} to T_{smax})	60–120 s
Ramp-up Rate (t_L to t_P)	3°C/s max.
Liquidous Temperature (T_L)	217°C
Time (t_L) Maintained Above (T_L)	60–150 s
Peak Body Package Temperature	260°C +0°C / -5°C
Time (t_P) within 5°C of 260°C	30 s
Ramp-down Rate (T_P to T_L)	6°C/s max.
Time 25°C to Peak Temperature	8 min max.

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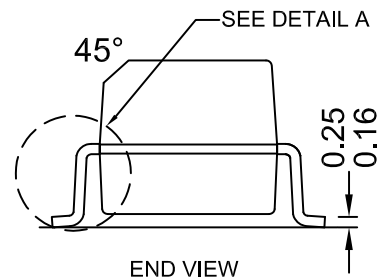
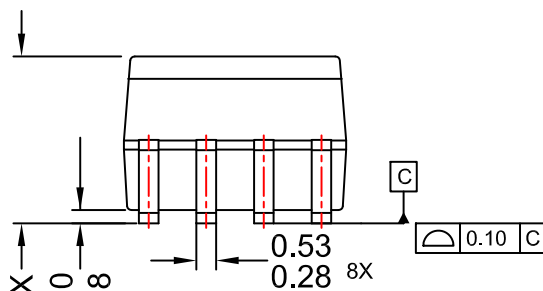
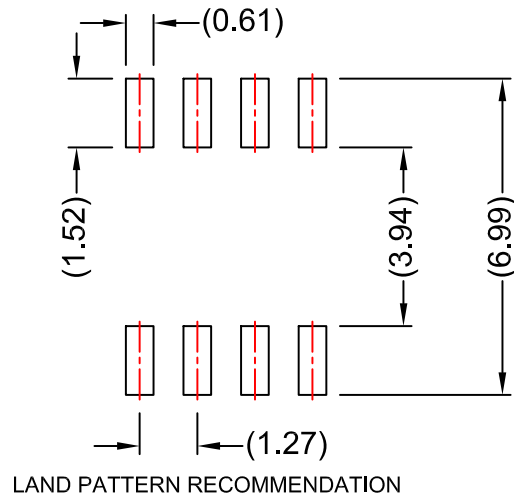
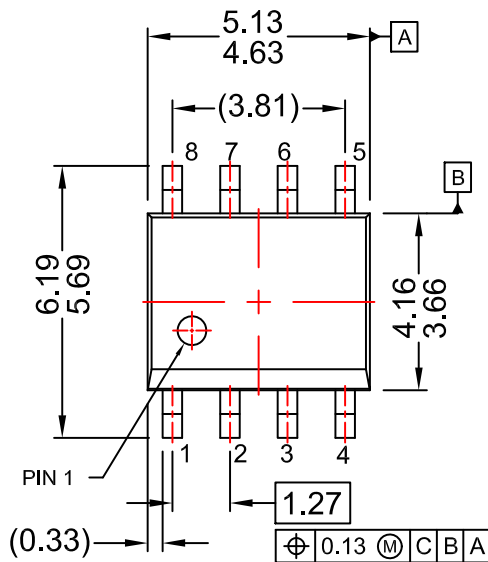
ORDERING INFORMATION

Part Number	Package	Shipping†
MOC223M	Small Outline 8-Pin	50 Units / Tube
MOC223R2M	Small Outline 8-Pin	2500 Units / Tape and Reel
MOC223VM	Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option	50 Units / Tube
MOC223R2VM	Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option	2500 Units / Tape and Reel
MOCD223M	Small Outline 8-Pin	50 Units / Tube
MOCD223R2M	Small Outline 8-Pin	2500 Units / Tape and Reel
MOCD223VM	Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option	50 Units / Tube
MOCD223R2VM	Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option	2500 Units / Tape and Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

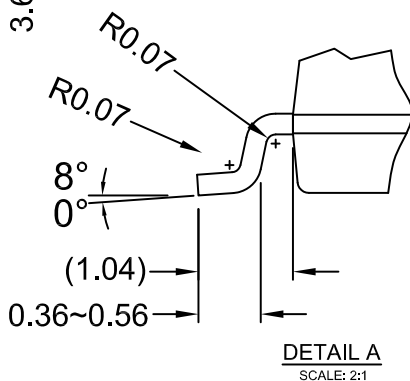
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ISSUE O

DATE 30 SEP 2016



NOTES:

- A) NO STANDARD APPLIES TO THIS PACKAGE
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONS DO NOT INCLUDE MOLD FLASH OR BURRS.
D) LANDPATTERN STANDARD: SOIC127P600X175-8M.



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