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July 2018

MOC223M, MOCD223M 8-pin SOIC Darlington Output Optocouplers

Features

- High Current Transfer Ratio of 500% Minimum at I_F = 1 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:
 - UL1577, 2,500 VAC_{RMS} for 1 Minute
 - DIN-EN/IEC60747-5-5, 565 V Peak Working Insulation Voltage

Applications

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

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.

Package Outline

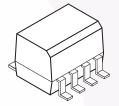


Figure 1. Package Outline

Schematics

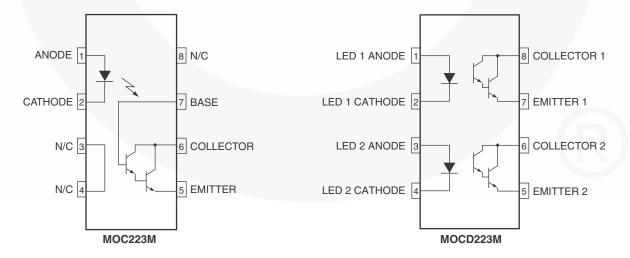


Figure 2. Schematics

Safety and Insulation Ratings

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.

Parameter		Characteristics
Installation Classifications per DIN VDE	< 150 V _{RMS}	I–IV
0110/1.89 Table 1, For Rated Mains Voltage	< 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	Input-to-Output Test Voltage, Method A, $V_{IORM} \times 1.6 = V_{PR}$, Type and Sample Test with $t_m = 10$ s, Partial Discharge < 5 pC		V _{peak}
V _{PR}	Input-to-Output Test Voltage, Method B, $V_{IORM} \times 1.875 = V_{PR}$, 100% Production Test with $t_m = 1$ s, Partial Discharge < 5 pC	1060	V _{peak}
V _{IORM}	Maximum Working Insulation Voltage	565	V _{peak}
V _{IOTM}	Highest Allowable Over-Voltage	4000	V _{peak}
	External Creepage	≥ 4	mm
	External Clearance	≥ 4	mm
DTI	Distance Through Insulation (Insulation Thickness)	≥ 0.4	mm
T _S	Case Temperature ⁽¹⁾	150	°C
I _{S,INPUT}	Input Current ⁽¹⁾	200	mA
P _{S,OUTPUT}	Output Power ⁽¹⁾	300	mW
R _{IO}	Insulation Resistance at T _S , V _{IO} = 500 V ⁽¹⁾	> 10 ⁹	Ω

Note:

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

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. $T_A = 25^{\circ}C$ unless otherwise specified.

Symbol	Rating	Value	Unit
TOTAL DEV	CE	1	
T _{STG}	Storage Temperature	-40 to +125	°C
T _A	Ambient Operating Temperature	-40 to +100	°C
TJ	Junction Temperature	-40 to +125	°C
T _{SOL}	Lead Solder Temperature	260 for 10 seconds	°C
Ъ	Total Device Power Dissipation @ T _A = 25°C	240	mW
P_{D}	Derate Above 25°C	2.94	mW/°C
EMITTER			
I _F	Continuous Forward Current	60	mA
I _F (pk)	Forward Current – Peak (PW = 100 µs, 120 pps)	1.0	Α
V_{R}	Reverse Voltage	6.0	V
Ь	LED Power Dissipation @ T _A = 25°C	90	mW
P_{D}	Derate Above 25°C	0.8	mW/°C
DETECTOR			
I _C	Continuous Collector Current	150	mA
V _{CEO}	Collector-Emitter Voltage	30	V
V _{CBO}	Collector-Base Voltage, MOC223M	70	V
V _{ECO}	Emitter-Collector Voltage	7	V
Ь	Detector Power Dissipation @ T _A = 25°C	150	mW
P_{D}	Derate Above 25°C	1.76	mW/°C

Electrical Characteristics

 $T_A = 25$ °C unless otherwise specified.

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
EMITTER			I.	U	l l	
V _F	Input Forward Voltage	I _F = 1.0 mA		1.08	1.3	V
I _R	Reverse Leakage Current	V _R = 6.0 V		0.001	100	μA
C _{IN}	Input Capacitance			18		pF
DETECTO	R		•			
I _{CEO1}	Collector-Emitter Dark Current	V _{CE} = 5.0 V, T _A = 25°C		1.0	50	nA
I _{CEO2}	Collector-Emitter Dark Current	V _{CE} = 5.0 V, T _A = 100°C		1.0		μA
BV _{CEO}	Collector-Emitter Breakdown Voltage	I _C = 100 μA	30	100		V
BV _{CBO}	Collector-Base Breakdown Voltage	I _C = 100 μA	70	120		V
BV _{ECO}	Emitter-Collector Breakdown Voltage	Ι _Ε = 100 μΑ	7	10		V
C _{CE}	Collector-Emitter Capacitance	f = 1.0 MHz, V _{CE} = 0		5.5		pF
COUPLED				III	J	
CTR	Current Transfer Ratio	$I_F = 1.0 \text{ mA}, V_{CE} = 5.0 \text{ V}$	500	1000		%
V _{CE(sat)}	Collector-Emitter Saturation Voltage	$I_C = 500 \mu A, I_F = 1.0 \text{ mA}$		\	1.0	V
t _{on}	Turn-On Time	I_F = 5.0 mA, V_{CC} = 10 V, R_L = 100 Ω (Figure 8)		10		μs
t _{off}	Turn-Off Time	I_F = 5.0 mA, V_{CC} = 10 V, R_L = 100 Ω (Figure 8)		55		μs
t _r	Rise Time	I_F = 5.0 mA, V_{CC} = 10 V, R_L = 100 Ω (Figure 8)		8		μs
t _f	Fall Time	I_F = 5.0 mA, V_{CC} = 10 V, R_L = 100 Ω (Figure 8)		45		μs

Isolation Characteristics

Symbol	Characteristic	Test Conditions	Min.	Тур.	Max.	Unit
V _{ISO}	Input-Output Isolation Voltage	t = 1 Minute	2500			VAC _{RMS}
C _{ISO}	Isolation Capacitance	V _{I-O} = 0 V, f = 1 MHz		0.2		pF
R _{ISO}	Isolation Resistance	$V_{I-O} = \pm 500 \text{ VDC}, T_A = 25^{\circ}\text{C}$	10 ¹¹			Ω

Typical Performance Curves

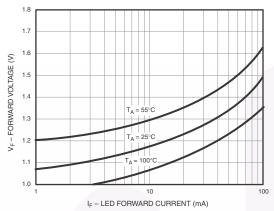


Figure 3. LED Forward Voltage vs. Forward Current

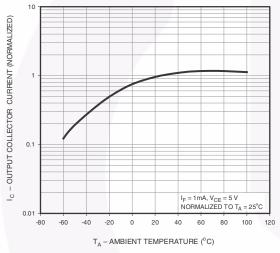


Figure 5. Output Current vs. Ambient Temperature

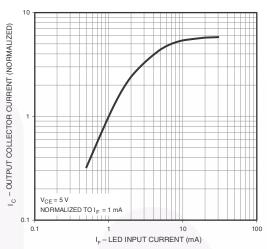


Figure 4. Output Curent vs. Input Current

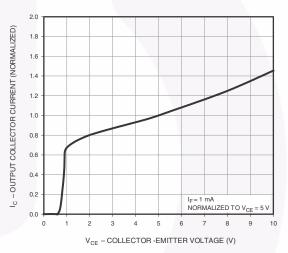


Figure 6. Output Current vs. Collector - Emitter Voltage

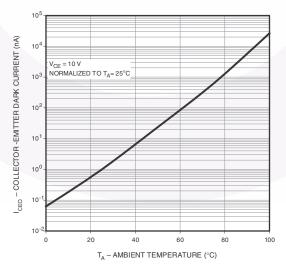


Figure 7. Dark Current vs. Ambient Temperature

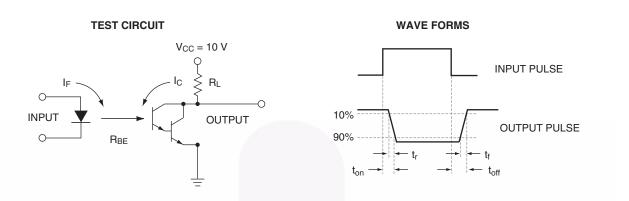


Figure 8. Switching Time Test Circuit and Waveform

Reflow Profile

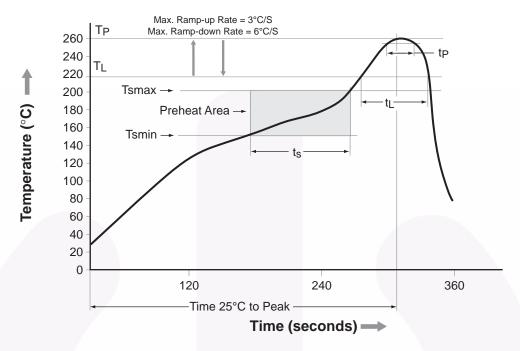


Figure 9. Reflow Profile

Profile Freature	Pb-Free Assembly Profile		
Temperature Minimum (Tsmin)	150°C		
Temperature Maximum (Tsmax)	200°C		
Time (t _S) from (Tsmin to Tsmax)	60-120 seconds		
Ramp-up Rate (t _L to t _P)	3°C/second maximum		
Liquidous Temperature (T _L)	217°C		
Time (t _L) Maintained Above (T _L)	60-150 seconds		
Peak Body Package Temperature	260°C +0°C / –5°C		
Time (t _P) within 5°C of 260°C	30 seconds		
Ramp-down Rate (T _P to T _L)	6°C/second maximum		
Time 25°C to Peak Temperature	8 minutes maximum		

Ordering Information

Part Number	Package	Packing Method
MOC223M	Small Outline 8-Pin	Tube (100 Units)
MOC223R2M	Small Outline 8-Pin	Tape and Reel (2500 Units)
MOC223VM	Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option	Tube (100 Units)
MOC223R2VM	Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option	Tape and Reel (2500 Units)
MOCD223M	Small Outline 8-Pin	Tube (100 Units)
MOCD223R2M	Small Outline 8-Pin	Tape and Reel (2500 Units)
MOCD223VM	Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option	Tube (100 Units)
MOCD223R2VM	Small Outline 8-Pin, DIN EN/IEC60747-5-5 Option	Tape and Reel (2500 Units)

Marking Information

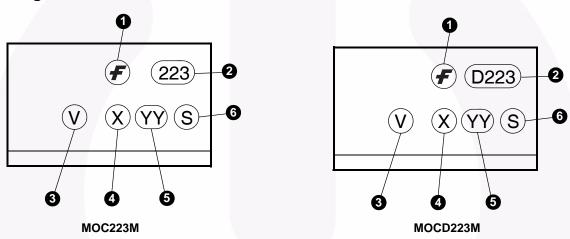
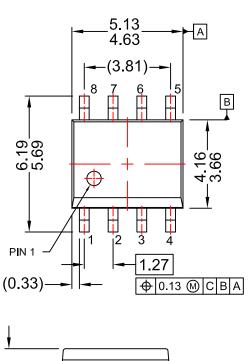
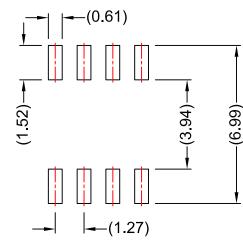


Figure 10. Top Marks

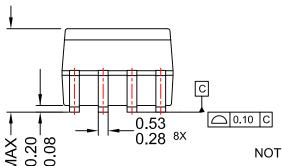
Table 1. Top Mark Definitions

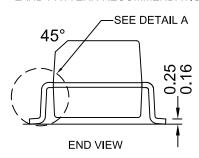
1	Fairchild Logo
2	Device Number
3	DIN EN/IEC60747-5-5 Option (only appears on component ordered with this option)
4	One-Digit Year Code, e.g., "4"
5	Digit Work Week, Ranging from "01" to "53"
6	Assembly Package Code





LAND PATTERN RECOMMENDATION



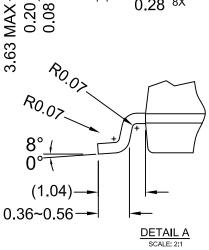






- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONS DO NOT INCLUDE MOLD FLASH OR BURRS.
- D) LANDPATTERN STANDARD: SOIC127P600X175-8M.
- E) DRAWING FILENAME: MKT-M08Erev5





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