

# Dual Channel Small Outline Optoisolators Darlington Output

The MOC223 device consists 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.

- Dual Channel Coupler
- Convenient Plastic SOIC-8 Surface Mountable Package Style
- High Output Current ( $I_C$ ) (500% min) @ 1 mA Input Current
- Minimum  $V_{(BR)CEO}$  of 30 Volts Guaranteed
- Standard SOIC-8 Footprint, with 0.050" Lead Spacing
- Shipped in Tape and Reel, which conforms to EIA Standard RS481A
- Compatible with Dual Wave, Vapor Phase and IR Reflow Soldering
- High Input-Output Isolation of 3000 Vac (rms) Guaranteed
- Meets U.L. Regulatory Requirements, File #E54915

**Ordering Information:**

- To obtain MOC223 in tape and reel, add R2 suffix to device number as follows:  
R2 = 2500 units on 13" reel
- To obtain MOC223 in quantities of 50 (shipped in sleeves) — no suffix

**Marking Information:**

- MOC223 = D223

**MAXIMUM RATINGS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Rating	Symbol	Value	Unit
<b>INPUT LED</b>			
Forward Current — Continuous	$I_F$	60	mA
Forward Current — Peak (PW = 100 $\mu\text{s}$ , 120 pps)	$I_{F(pk)}$	1.0	A
Reverse Voltage	$V_R$	6.0	V
LED Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	90 0.8	mW mW/ $^\circ\text{C}$
<b>OUTPUT DARLINGTON</b>			
Collector-Emitter Voltage	$V_{CEO}$	30	V
Collector-Base Voltage	$V_{CBO}$	70	V
Emitter-Collector Voltage	$V_{ECO}$	7.0	V
Collector Current — Continuous	$I_C$	150	mA
Detector Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	150 1.76	mW mW/ $^\circ\text{C}$

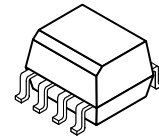
NOTE: Thickness through insulation between input and output is  $\geq 0.5$  mm.

## MOC223

[CTR = 500% Min]

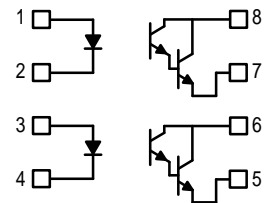
Motorola Preferred Device

**DUAL CHANNEL  
SMALL OUTLINE  
OPTOISOLATOR  
DARLINGTON OUTPUT**



**CASE 846-01, STYLE 3  
PLASTIC**

**SCHEMATIC**



1. LED 1 ANODE
2. LED 1 CATHODE
3. LED 2 ANODE
4. LED 2 CATHODE
5. EMITTER 2
6. COLLECTOR 2
7. EMITTER 1
8. COLLECTOR 1

Preferred devices are Motorola recommended choices for future use and best overall value.

# MOCD223

## MAXIMUM RATINGS — continued ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
<b>TOTAL DEVICE</b>			
Input–Output Isolation Voltage <sup>(1,2)</sup> (60 Hz, 1.0 sec. duration)	$V_{ISO}$	3000	Vac(rms)
Total Device Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	250 2.94	mW mW/ $^\circ\text{C}$
Ambient Operating Temperature Range <sup>(3)</sup>	$T_A$	$-55$ to $+100$	$^\circ\text{C}$
Storage Temperature Range <sup>(3)</sup>	$T_{stg}$	$-55$ to $+150$	$^\circ\text{C}$
Lead Soldering Temperature (1/16" from case, 10 sec. duration)	—	260	$^\circ\text{C}$

## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)<sup>(4)</sup>

Characteristic	Symbol	Min	Typ <sup>(4)</sup>	Max	Unit
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### INPUT LED

Forward Voltage ( $I_F = 1.0$ mA)	$V_F$	—	1.05	1.3	V
Reverse Leakage Current ( $V_R = 6.0$ V)	$I_R$	—	0.1	100	$\mu\text{A}$
Capacitance	C	—	18	—	pF

### OUTPUT DARLINGTON

Collector–Emitter Dark Current $(V_{CE} = 5.0$ V, $T_A = 25^\circ\text{C}$ )	$I_{CEO1}$	—	1.0	50	nA
	$I_{CEO2}$	—	1.0	—	$\mu\text{A}$
Collector–Emitter Breakdown Voltage ( $I_C = 100$ $\mu\text{A}$ )	$V_{(BR)CEO}$	30	90	—	V
Emitter–Collector Breakdown Voltage ( $I_E = 100$ $\mu\text{A}$ )	$V_{(BR)ECO}$	7.0	7.8	—	V
Collector–Emitter Capacitance ( $f = 1.0$ MHz, $V_{CE} = 0$ )	$C_{CE}$	—	5.5	—	pF

### COUPLED

Output Collector Current ( $I_F = 1.0$ mA, $V_{CE} = 5.0$ V)	MOCD223	$I_C$ (CTR) <sup>(5)</sup>	5.0 (500)	10 (1000)	—	mA (%)
Collector–Emitter Saturation Voltage ( $I_C = 500$ $\mu\text{A}$ , $I_F = 1.0$ mA)		$V_{CE(sat)}$	—	—	1.0	V
Turn–On Time ( $I_F = 5.0$ mA, $V_{CC} = 10$ V, $R_L = 100$ $\Omega$ )		$t_{on}$	—	3.5	—	$\mu\text{s}$
Turn–Off Time ( $I_F = 5.0$ mA, $V_{CC} = 10$ V, $R_L = 100$ $\Omega$ )		$t_{off}$	—	95	—	$\mu\text{s}$
Rise Time ( $I_F = 5.0$ mA, $V_{CC} = 10$ V, $R_L = 100$ $\Omega$ )		$t_r$	—	1.0	—	$\mu\text{s}$
Fall Time ( $I_F = 5.0$ mA, $V_{CC} = 10$ V, $R_L = 100$ $\Omega$ )		$t_f$	—	2.0	—	$\mu\text{s}$
Input–Output Isolation Voltage ( $f = 60$ Hz, $t = 1.0$ sec.) <sup>(1,2)</sup>		$V_{ISO}$	3000	—	—	Vac(rms)
Isolation Resistance ( $V_{I-O} = 500$ V) <sup>(2)</sup>		$R_{ISO}$	$10^{11}$	—	—	$\Omega$
Isolation Capacitance ( $V_{I-O} = 0$ , $f = 1.0$ MHz) <sup>(2)</sup>		$C_{ISO}$	—	0.2	—	pF

1. Input–Output Isolation 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. Refer to Quality and Reliability Section in Opto Data Book for information on test conditions.
4. Always design to the specified minimum/maximum electrical limits (where applicable).
5. Current Transfer Ratio (CTR) =  $I_C/I_F \times 100\%$ .

TYPICAL CHARACTERISTICS

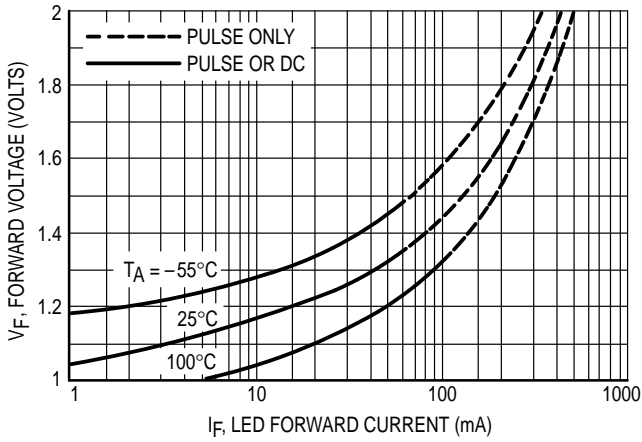


Figure 1. LED Forward Voltage versus Forward Current

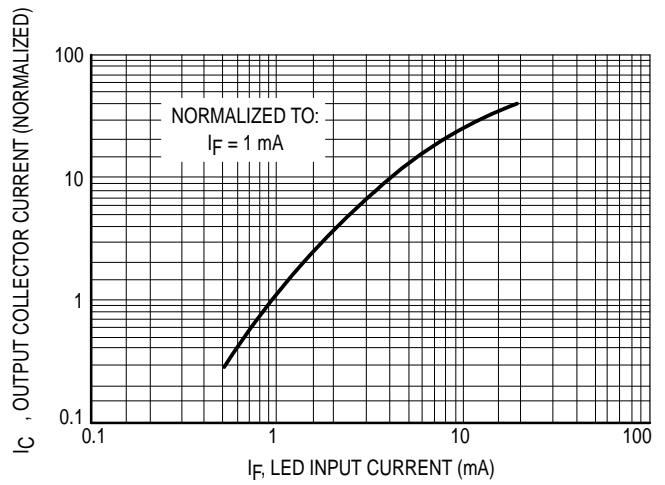


Figure 2. Output Current versus Input Current

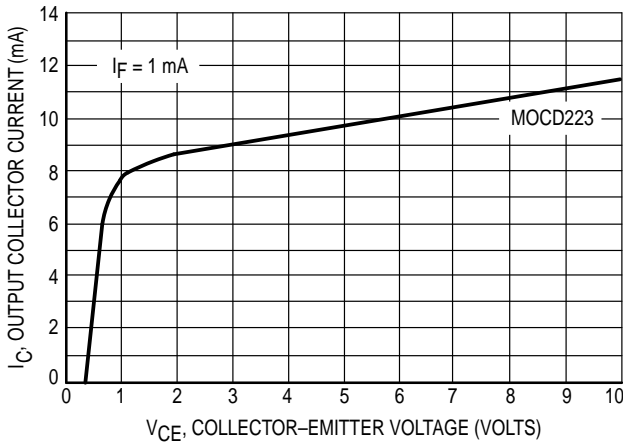


Figure 3. Output Current versus Collector-Emitter Voltage

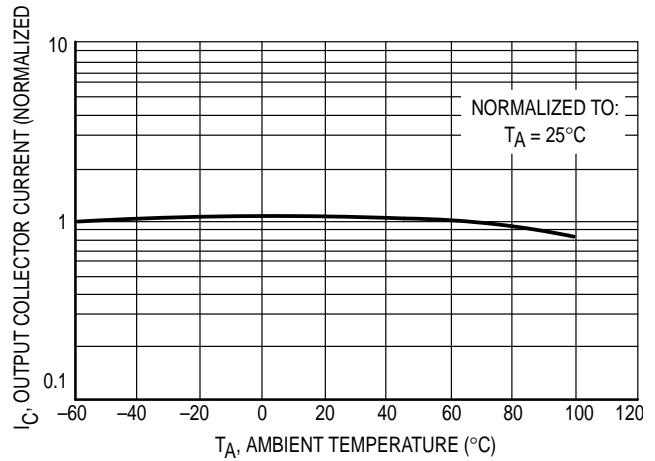


Figure 4. Output Current versus Ambient Temperature

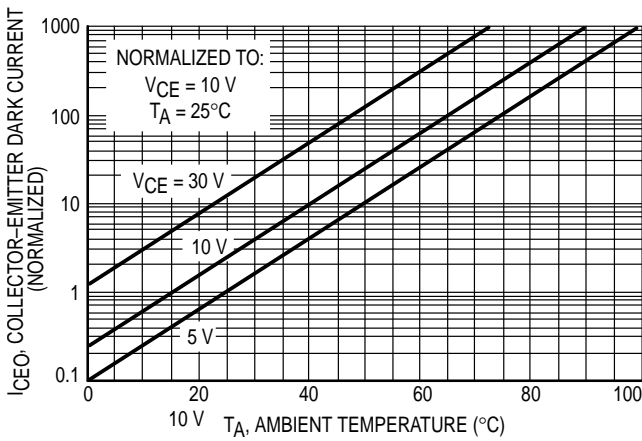


Figure 5. Dark Current versus Ambient Temperature

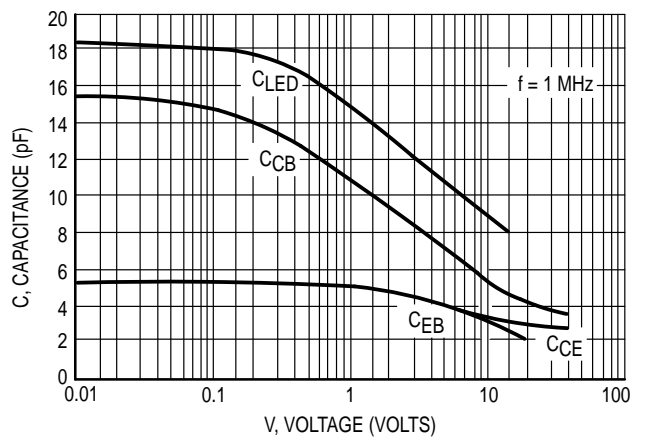
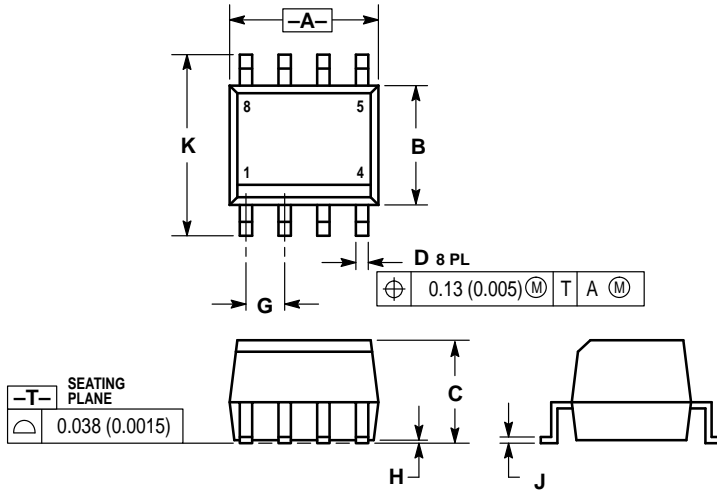


Figure 6. Capacitance versus Voltage

PACKAGE DIMENSIONS



NOTES:  
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
 2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.182	0.202	4.63	5.13
B	0.144	0.164	3.66	4.16
C	0.123	0.143	3.13	3.63
D	0.011	0.021	0.28	0.53
G	0.050 BSC		1.27 BSC	
H	0.003	0.008	0.08	0.20
J	0.006	0.010	0.16	0.25
K	0.224	0.244	5.69	6.19

STYLE 3:  
 PIN 1. ANODE 1  
 2. CATHODE 1  
 3. ANODE 2  
 4. CATHODE 2  
 5. EMITTER 2  
 6. COLLECTOR 2  
 7. EMITTER 1  
 8. COLLECTOR 1

CASE 846-01  
 ISSUE B

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