


# Small Outline Optoisolators

## Darlington Output

These devices consist of a gallium arsenide infrared emitting diode optically coupled to a monolithic silicon photodarlington detector, in a surface mountable, small outline, plastic package. They are ideally suited for high density applications, and eliminate the need for through-the-board mounting.

- Convenient Plastic SOIC-8 Surface Mountable Package Style
- High Current Transfer Ratio (CTR) at Low LED Input Current, for Easier Logic Interfacing
- 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
- UL Recognized  File #E54915

### Ordering Information:

- To obtain MOC223 in Tape and Reel, add R2 suffix to device numbers:  
R2 = 2500 units on 13" reel
- To obtain MOC223 in quantities of 50 (shipped in sleeves) — No Suffix

### Marking Information:

- MOC223 = 223

### Applications:

- Low power Logic Circuits
- Interfacing and coupling systems of different potentials and impedances
- Telecommunications equipment
- Portable electronics

### 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)	$I_F(\text{pk})$	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/ $^\circ\text{C}$

### OUTPUT DARLINGTON

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/ $^\circ\text{C}$

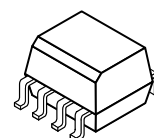
**Preferred** devices are Motorola recommended choices for future use and best overall value.

# MOC223

[CTR = 500% Min]

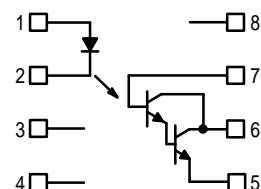
Motorola Preferred Device

**SMALL OUTLINE  
OPTOISOLATORS  
DARLINGTON OUTPUT**



**CASE 846-01, STYLE 1  
PLASTIC**

### SCHEMATIC



1. LED ANODE
2. LED CATHODE
3. NO CONNECTION
4. NO CONNECTION
5. EMITTER
6. COLLECTOR
7. BASE
8. NO CONNECTION



# MOC223

## MAXIMUM RATINGS — continued (T<sub>A</sub> = 25°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 <sub>ISO</sub>	3000	Vac(rms)
Total Device Power Dissipation @ T <sub>A</sub> = 25°C Derate above 25°C	P <sub>D</sub>	250 2.94	mW mW/°C
Ambient Operating Temperature Range <sup>(3)</sup>	T <sub>A</sub>	–45 to +100	°C
Storage Temperature Range <sup>(3)</sup>	T <sub>stg</sub>	–45 to +125	°C
Lead Soldering Temperature (1/16" from case, 10 sec. duration)	—	260	°C

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°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 <sub>F</sub> = 1.0 mA)	V <sub>F</sub>	—	1.05	1.3	V
Reverse Leakage Current (V <sub>R</sub> = 6.0 V)	I <sub>R</sub>	—	0.1	100	μA
Capacitance	C	—	18	—	pF

### OUTPUT DARLINGTON

Collector–Emitter Dark Current (V <sub>CE</sub> = 5.0 V, T <sub>A</sub> = 25°C) (V <sub>CE</sub> = 5.0 V, T <sub>A</sub> = 100°C)	I <sub>CEO1</sub>	—	1.0	50	nA
	I <sub>CEO2</sub>	—	1.0	—	μA
Collector–Emitter Breakdown Voltage (I <sub>C</sub> = 100 μA)	V <sub>(BR)CEO</sub>	30	90	—	V
Emitter–Collector Breakdown Voltage (I <sub>E</sub> = 100 μA)	V <sub>(BR)ECO</sub>	7.0	7.8	—	V
Collector–Emitter Capacitance (f = 1.0 MHz, V <sub>CE</sub> = 0)	C <sub>CE</sub>	—	5.5	—	pF

### COUPLED

Output Collector Current (I <sub>F</sub> = 1.0 mA, V <sub>CE</sub> = 5.0 V)	I <sub>C</sub> (CTR) <sup>(5)</sup>	5.0 (500)	10 (1000)	—	mA (%)
Collector–Emitter Saturation Voltage (I <sub>C</sub> = 500 μA, I <sub>F</sub> = 1.0 mA)	V <sub>CE(sat)</sub>	—	—	1.0	V
Turn–On Time (I <sub>F</sub> = 5.0 mA, V <sub>CC</sub> = 10 V, R <sub>L</sub> = 100 Ω)	t <sub>on</sub>	—	3.5	—	μs
Turn–Off Time (I <sub>F</sub> = 5.0 mA, V <sub>CC</sub> = 10 V, R <sub>L</sub> = 100 Ω)	t <sub>off</sub>	—	95	—	μs
Rise Time (I <sub>F</sub> = 5.0 mA, V <sub>CC</sub> = 10 V, R <sub>L</sub> = 100 Ω)	t <sub>r</sub>	—	1.0	—	μs
Fall Time (I <sub>F</sub> = 5.0 mA, V <sub>CC</sub> = 10 V, R <sub>L</sub> = 100 Ω)	t <sub>f</sub>	—	2.0	—	μs
Input–Output Isolation Voltage (f = 60 Hz, t = 1.0 sec.) <sup>(1,2)</sup>	V <sub>ISO</sub>	3000	—	—	Vac(rms)
Isolation Resistance (V <sub>I–O</sub> = 500 V) <sup>(2)</sup>	R <sub>ISO</sub>	10 <sup>11</sup>	—	—	Ω
Isolation Capacitance (V <sub>I–O</sub> = 0, f = 1.0 MHz) <sup>(2)</sup>	C <sub>ISO</sub>	—	0.2	—	pF

1. Input–Output Isolation Voltage, V<sub>ISO</sub>, 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. 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<sub>C</sub>/I<sub>F</sub> × 100%.

## TYPICAL CHARACTERISTICS

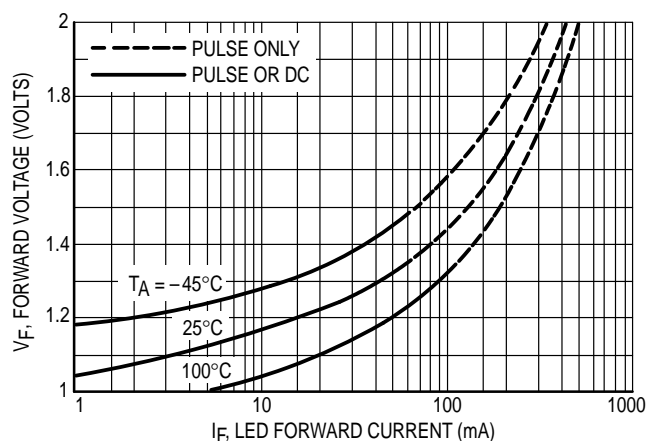


Figure 1. LED Forward Voltage versus Forward Current

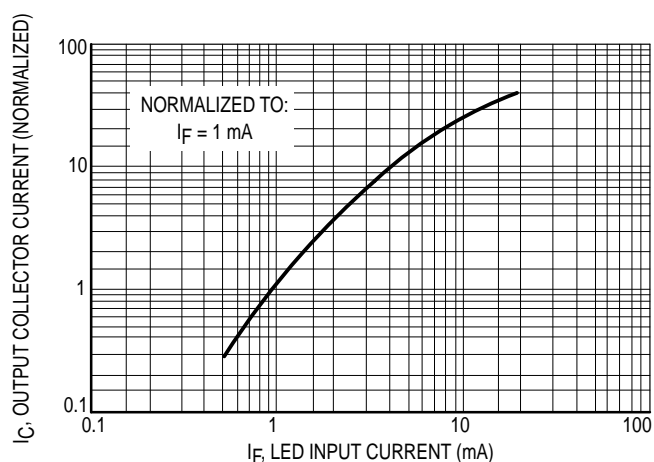


Figure 2. Output Current versus Input Current

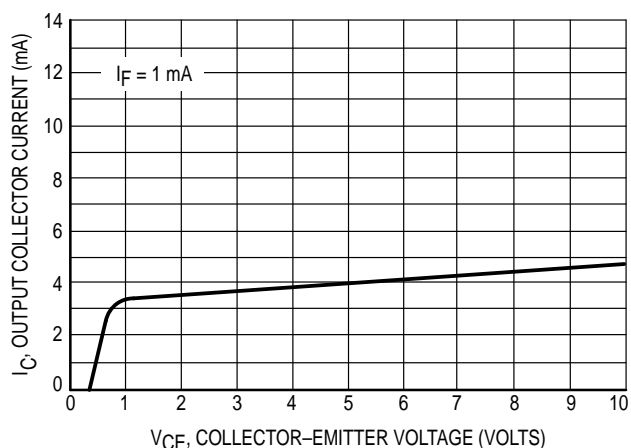


Figure 3. Output Current versus Collector-Emitter Voltage

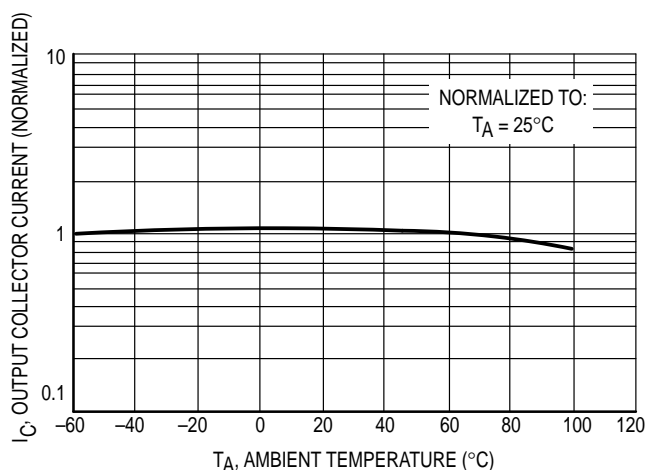


Figure 4. Output Current versus Ambient Temperature

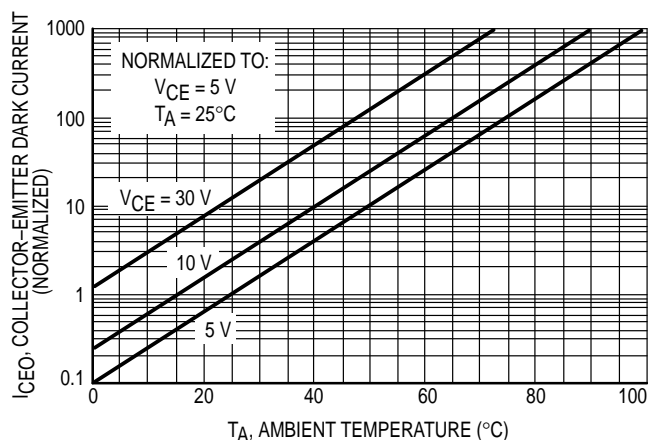


Figure 5. Dark Current versus Ambient Temperature

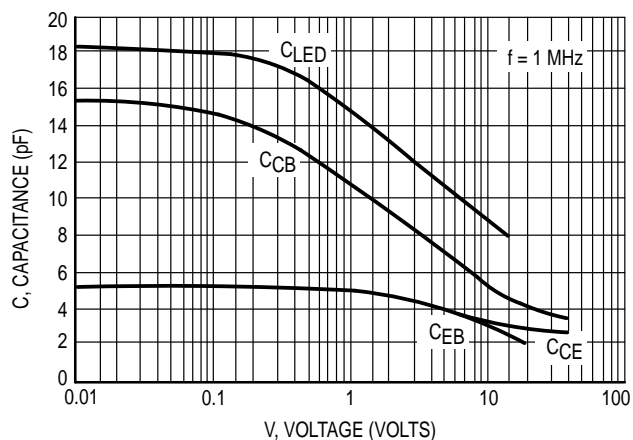
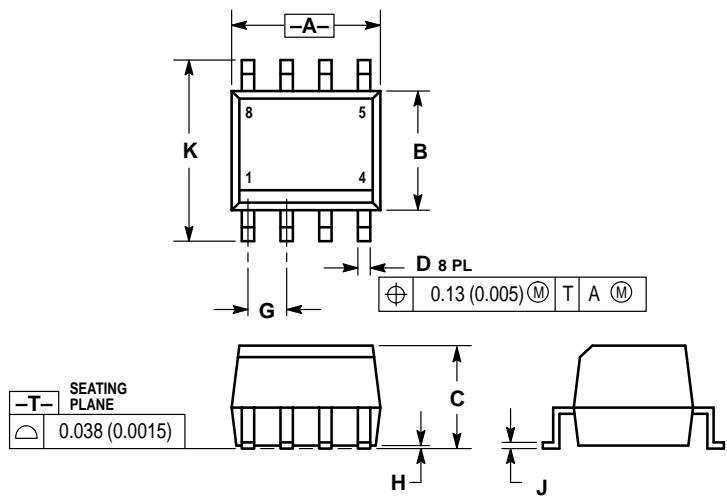


Figure 6. Capacitance versus Voltage

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 1:
- PIN 1. ANODE
  - 2. CATHODE
  - 3. NC
  - 4. NC
  - 5. EMITTER
  - 6. COLLECTOR
  - 7. BASE
  - 8. NC

CASE 846-01  
ISSUE E

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