

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 |
|--------|--------|-------|------|
|--------|--------|-------|------|

INPUT LED

| | | | |
|---|------------------|-----------|----------------------------|
| Forward Current — Continuous | I_F | 60 | mA |
| Forward Current — Peak (PW = 100 μs , 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°C | PD | 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°C | PD | 150 1.76 | mW mW/ $^\circ\text{C}$ |

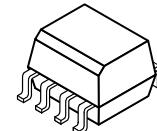
Preferred devices are Motorola recommended choices for future use and best overall value.

MOC223

[CTR = 500% Min]

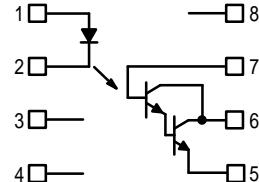
Motorola Preferred Device

**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_A = 25°C unless otherwise noted)

| Rating | Symbol | Value | Unit |
|---|------------------|-------------|-----------------------|
| TOTAL DEVICE | | | |
| Input–Output Isolation Voltage ^(1,2) (60 Hz, 1.0 sec. duration) | V _{ISO} | 3000 | V _{ac} (rms) |
| Total Device Power Dissipation @ T _A = 25°C Derate above 25°C | P _D | 250 2.94 | mW mW/°C |
| Ambient Operating Temperature Range ⁽³⁾ | T _A | –45 to +100 | °C |
| Storage Temperature Range ⁽³⁾ | T _{stg} | –45 to +125 | °C |
| Lead Soldering Temperature (1/16" from case, 10 sec. duration) | — | 260 | °C |

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)⁽⁴⁾

| Characteristic | Symbol | Min | Typ ⁽⁴⁾ | Max | Unit |
|--|----------------|-----|--------------------|-----|------|
| 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 | μA |
| Capacitance | C | — | 18 | — | pF |

OUTPUT DARLINGTON

| | | | | | |
|---|----------------------|-----|-----|----|----|
| Collector–Emitter Dark Current (V _{CE} = 5.0 V, T _A = 25°C) (V _{CE} = 5.0 V, T _A = 100°C) | I _{CEO1} | — | 1.0 | 50 | nA |
| | I _{CEO2} | — | 1.0 | — | μA |
| Collector–Emitter Breakdown Voltage (I _C = 100 μA) | V _{(BR)CEO} | 30 | 90 | — | V |
| Emitter–Collector Breakdown Voltage (I _E = 100 μA) | V _{(BR)ECO} | 7.0 | 7.8 | — | V |
| Collector–Emitter Capacitance (f = 1.0 MHz, V _{CE} = 0) | C _{CCE} | — | 5.5 | — | pF |

COUPLED

| | | | | | |
|---|-------------------------------------|------------------|-----------|-----|-----------------------|
| Output Collector Current (I _F = 1.0 mA, V _{CE} = 5.0 V) | I _C (CTR) ⁽⁵⁾ | 5.0 (500) | 10 (1000) | — | mA (%) |
| Collector–Emitter Saturation Voltage (I _C = 500 μA, 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 Ω) | t _{on} | — | 3.5 | — | μs |
| Turn–Off Time (I _F = 5.0 mA, V _{CC} = 10 V, R _L = 100 Ω) | t _{off} | — | 95 | — | μs |
| Rise Time (I _F = 5.0 mA, V _{CC} = 10 V, R _L = 100 Ω) | t _r | — | 1.0 | — | μs |
| Fall Time (I _F = 5.0 mA, V _{CC} = 10 V, R _L = 100 Ω) | t _f | — | 2.0 | — | μs |
| Input–Output Isolation Voltage (f = 60 Hz, t = 1.0 sec.) ^(1,2) | V _{ISO} | 3000 | — | — | V _{ac} (rms) |
| Isolation Resistance (V _{I–O} = 500 V) ⁽²⁾ | R _{ISO} | 10 ¹¹ | — | — | Ω |
| Isolation Capacitance (V _{I–O} = 0, f = 1.0 MHz) ⁽²⁾ | 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 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_C/I_F x 100%.

TYPICAL CHARACTERISTICS

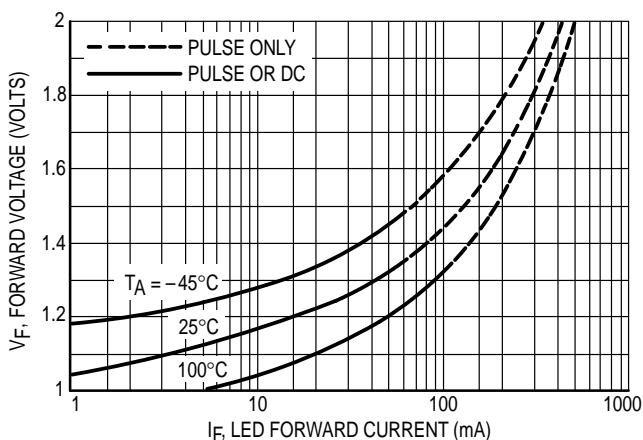


Figure 1. LED Forward Voltage versus Forward Current

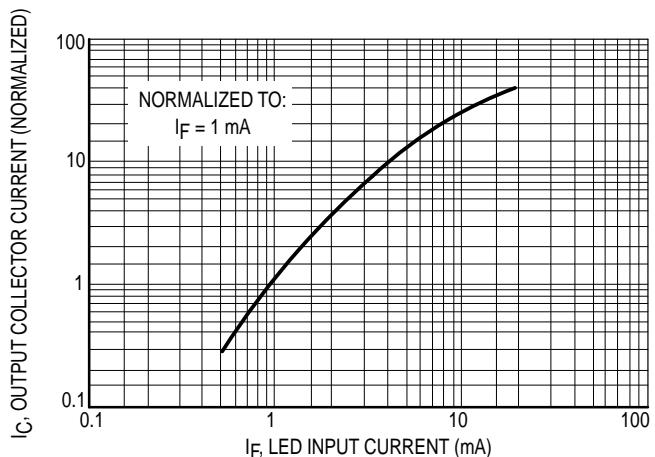


Figure 2. Output Current versus Input Current

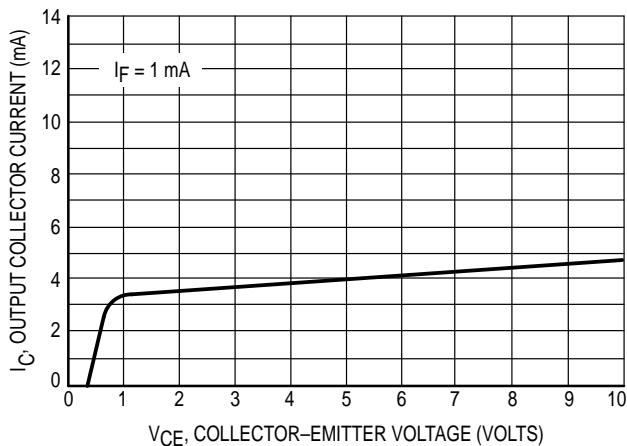


Figure 3. Output Current versus Collector-Emitter Voltage

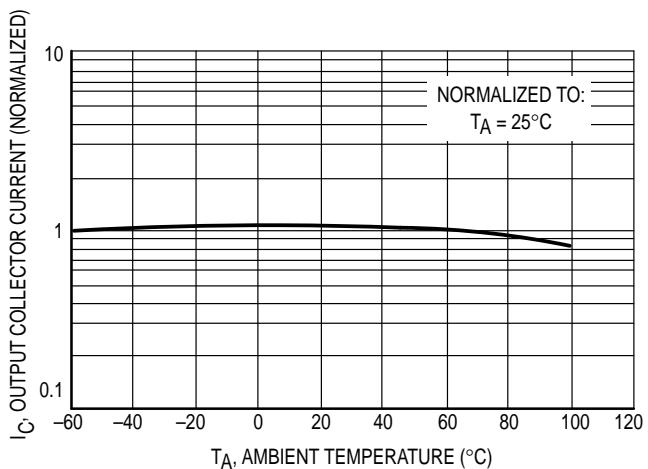


Figure 4. Output Current versus Ambient Temperature

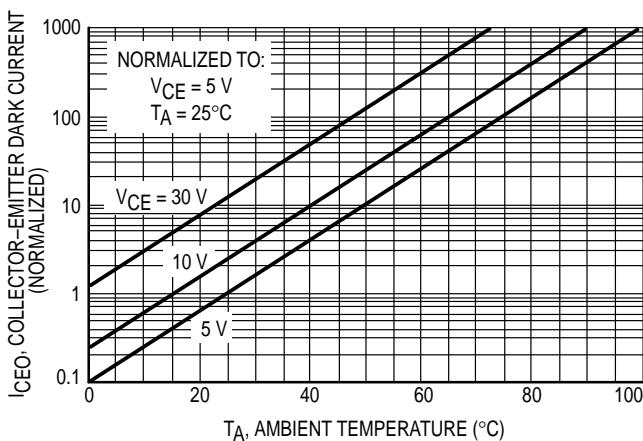


Figure 5. Dark Current versus Ambient Temperature

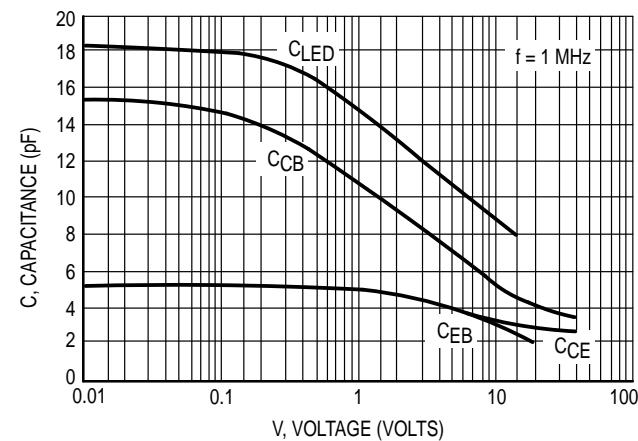
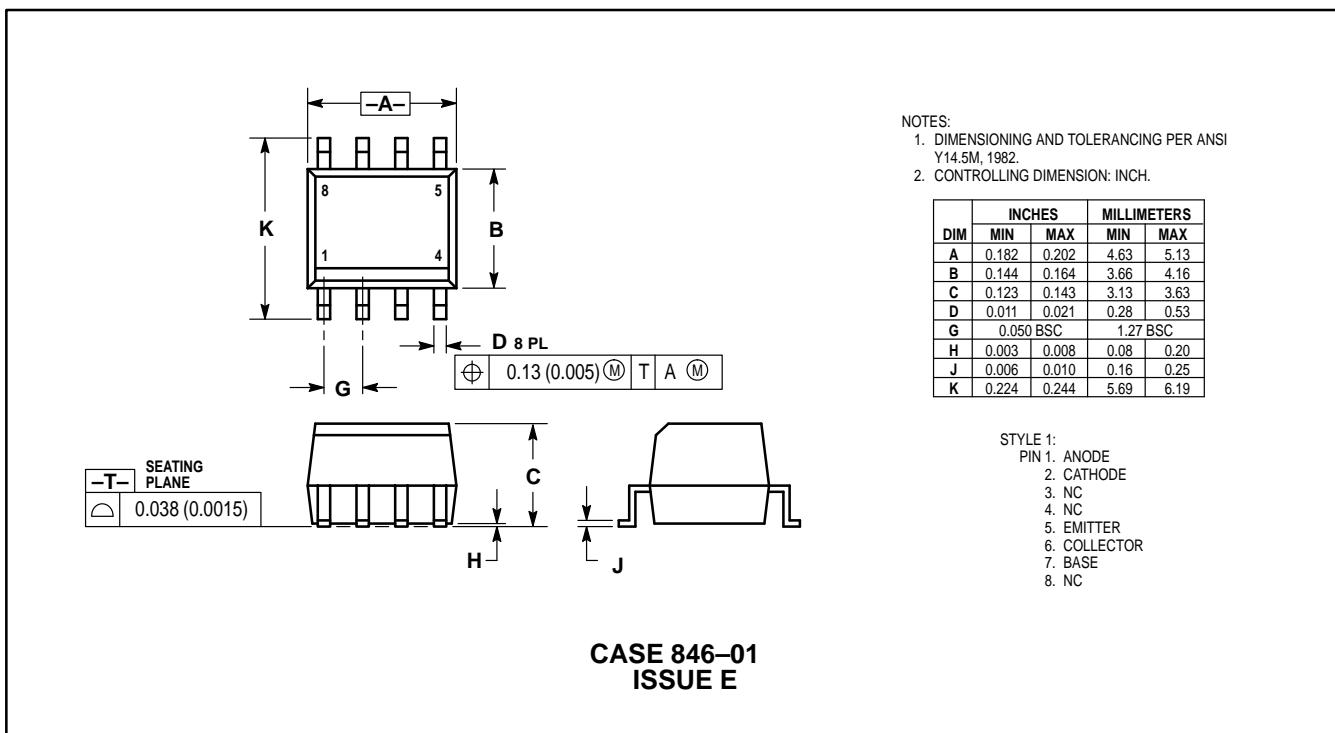


Figure 6. Capacitance versus Voltage

PACKAGE DIMENSIONS



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How to reach us:

USA/EUROPE/Locations Not Listed: Motorola Literature Distribution;
P.O. Box 5405, Denver, Colorado 80217. 1-303-675-2140 or 1-800-441-2447

JAPAN: Nippon Motorola Ltd.; SPD, Strategic Planning Office, 141, 4-32-1 Nishi-Gotanda, Shinagawa-ku, Tokyo, Japan. 81-3-5487-8488

Customer Focus Center: 1-800-521-6274

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ASIA/PACIFIC: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park, 51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298