


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°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(pk)} | 1.0 | A |
| Reverse Voltage | V _R | 6.0 | V |
| LED Power Dissipation @ T _A = 25°C Derate above 25°C | P _D | 90 0.8 | mW mW/°C |
| OUTPUT DARLINGTON | | | |
| Collector-Emitter Voltage | V _{CEO} | 30 | V |
| Collector-Base Voltage | V _{CB0} | 70 | V |
| Emitter-Collector Voltage | V _{ECO} | 7.0 | V |
| Collector Current — Continuous | I _C | 150 | mA |
| Detector Power Dissipation @ T _A = 25°C Derate above 25°C | P _D | 150 1.76 | mW mW/°C |

NOTE: Thickness through insulation between input and output is ≥ 0.5 mm.

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

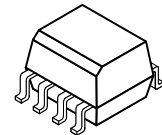
(Replaces MOC221/D)

MOC223

[CTR = 500% Min]

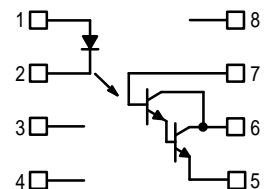
Motorola Preferred Device

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

| Rating | Symbol | Value | Unit |
|--|-----------|-------------|----------------------------|
| TOTAL DEVICE | | | |
| Input–Output Isolation Voltage ^(1,2) (60 Hz, 1.0 sec. duration) | V_{ISO} | 3000 | Vac(rms) |
| Total Device Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 250 2.94 | mW mW/ $^\circ\text{C}$ |
| Ambient Operating Temperature Range ⁽³⁾ | T_A | -55 to +100 | $^\circ\text{C}$ |
| Storage Temperature Range ⁽³⁾ | 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)⁽⁴⁾

| Characteristic | Symbol | Min | Typ ⁽⁴⁾ | Max | Unit |
|--|----------------------------|-----------|--------------------|-----|---------------|
| INPUT LED | | | | | |
| Forward Voltage ($I_F = 1.0\text{ mA}$) | V_F | — | 1.05 | 1.3 | V |
| Reverse Leakage Current ($V_R = 6.0\text{ V}$) | I_R | — | 0.1 | 100 | μA |
| Capacitance | C | — | 18 | — | pF |
| OUTPUT DARLINGTON | | | | | |
| Collector–Emitter Dark Current ($V_{CE} = 5.0\text{ V}$, $T_A = 25^\circ\text{C}$) | I_{CEO1} | — | 1.0 | 50 | nA |
| | I_{CEO2} | — | 1.0 | — | μA |
| $(V_{CE} = 5.0\text{ V}$, $T_A = 100^\circ\text{C}$) | | | | | |
| 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 ($f = 1.0\text{ MHz}$, $V_{CE} = 0$) | C_{CE} | — | 5.5 | — | pF |
| COUPLED | | | | | |
| Output Collector Current ($I_F = 1.0\text{ mA}$, $V_{CE} = 5.0\text{ V}$) | I_C (CTR) ⁽⁵⁾ | 5.0 (500) | 10 (1000) | — | mA (%) |
| Collector–Emitter Saturation Voltage ($I_C = 500\ \mu\text{A}$, $I_F = 1.0\text{ mA}$) | $V_{CE(sat)}$ | — | — | 1.0 | V |
| Turn–On Time ($I_F = 5.0\text{ mA}$, $V_{CC} = 10\text{ V}$, $R_L = 100\ \Omega$) | t_{on} | — | 3.5 | — | μs |
| Turn–Off Time ($I_F = 5.0\text{ mA}$, $V_{CC} = 10\text{ V}$, $R_L = 100\ \Omega$) | t_{off} | — | 95 | — | μs |
| Rise Time ($I_F = 5.0\text{ mA}$, $V_{CC} = 10\text{ V}$, $R_L = 100\ \Omega$) | t_r | — | 1.0 | — | μs |
| Fall Time ($I_F = 5.0\text{ mA}$, $V_{CC} = 10\text{ V}$, $R_L = 100\ \Omega$) | t_f | — | 2.0 | — | μs |
| Input–Output Isolation Voltage ($f = 60\text{ Hz}$, $t = 1.0\text{ sec.}$) ^(1,2) | V_{ISO} | 3000 | — | — | Vac(rms) |
| Isolation Resistance ($V_{I-O} = 500\text{ V}$) ⁽²⁾ | R_{ISO} | 10^{11} | — | — | Ω |
| Isolation Capacitance ($V_{I-O} = 0$, $f = 1.0\text{ MHz}$) ⁽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) = $I_C/I_F \times 100\%$.

TYPICAL CHARACTERISTICS

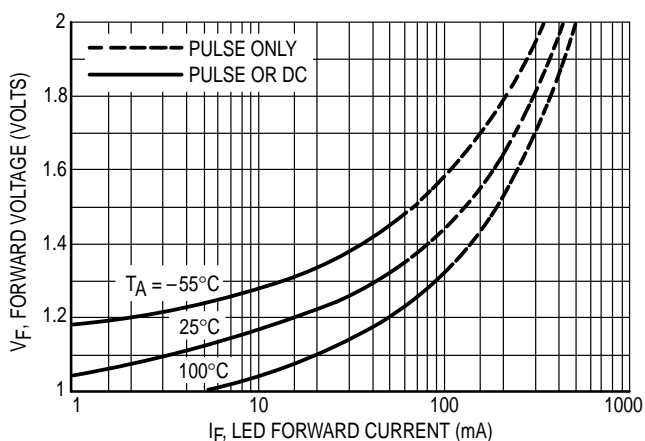


Figure 1. LED Forward Voltage versus Forward Current

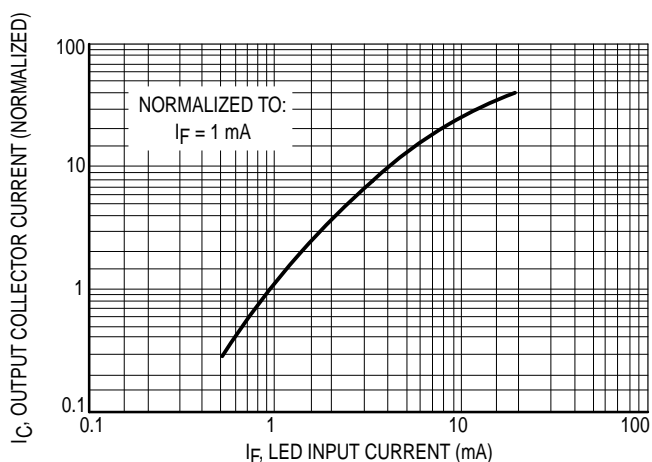


Figure 2. Output Current versus Input Current

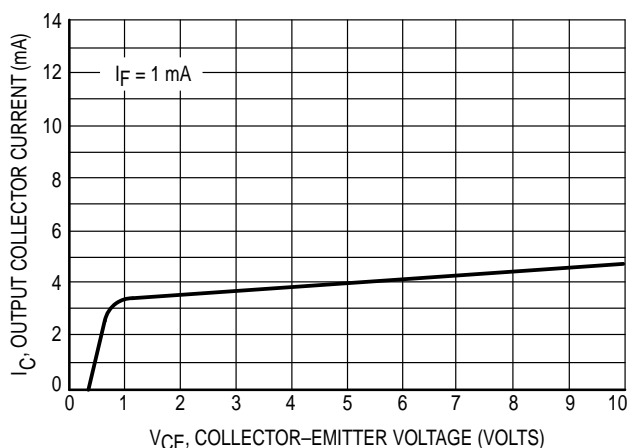


Figure 3. Output Current versus Collector-Emitter Voltage

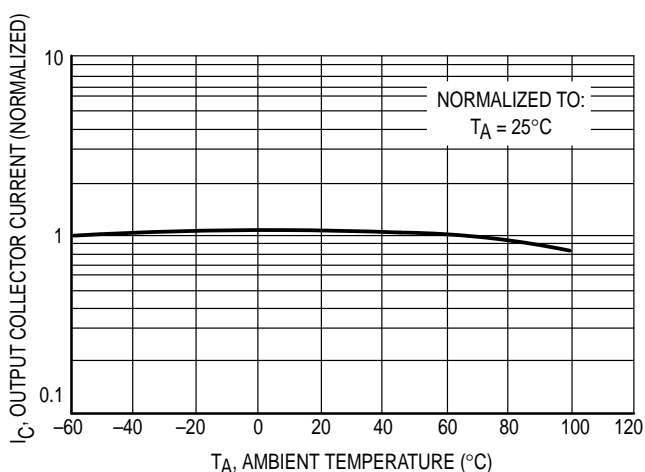


Figure 4. Output Current versus Ambient Temperature

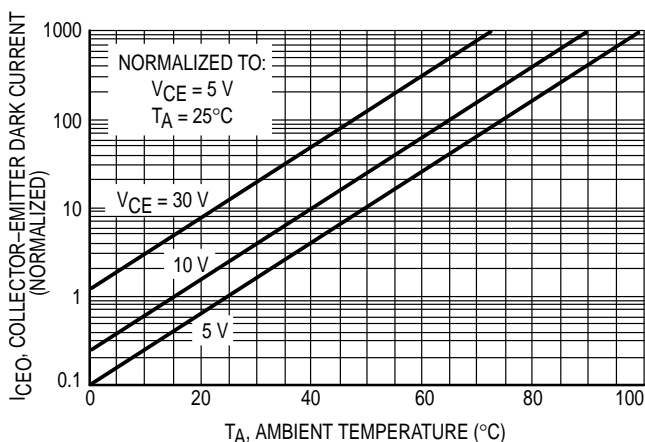


Figure 5. Dark Current versus Ambient Temperature

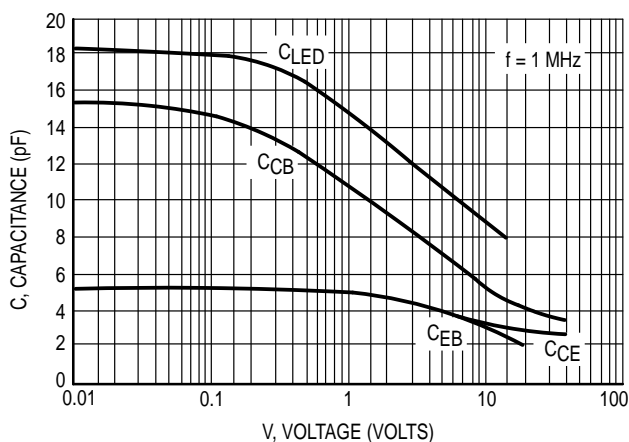
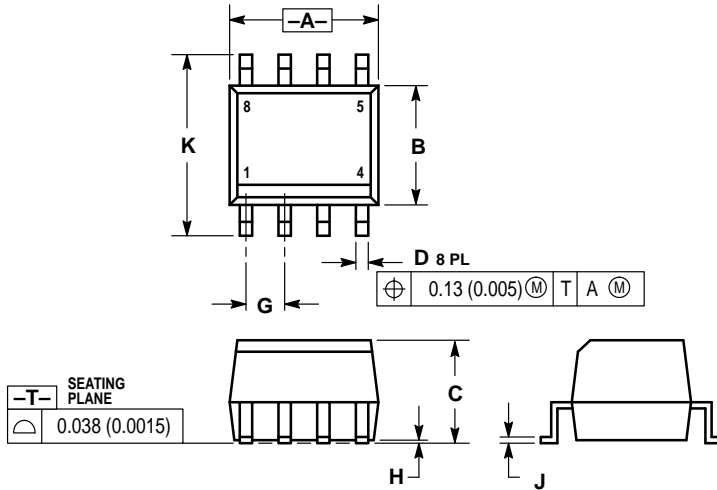


Figure 6. Capacitance versus Voltage

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

CASE 846-01
 ISSUE B

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How to reach us:

USA/EUROPE: Motorola Literature Distribution;
 P.O. Box 20912; Phoenix, Arizona 85036. 1-800-441-2447

JAPAN: Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, Toshikatsu Otsuki,
 6F Seibu-Butsuryu-Center, 3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 03-3521-8315

MFAX: RMFAX0@email.sps.mot.com -TOUCHTONE (602) 244-6609
 INTERNET: http://Design-NET.com

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

