

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 |
|--|-------------|-------------|----------------------------|
| INPUT LED | | | |
| Forward Current — Continuous | I_F | 60 | mA |
| Forward Current — Peak ($PW = 100 \mu\text{s}, 120 \text{ pps}$) | $I_{F(pk)}$ | 1.0 | A |
| Reverse Voltage | V_R | 6.0 | V |
| LED Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°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°C | P_D | 150 1.76 | mW mW/ $^\circ\text{C}$ |

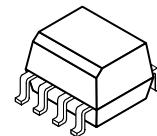
NOTE: Thickness through insulation between input and output is $\geq 0.5 \text{ mm}$.

MOC223

[CTR = 500% Min]

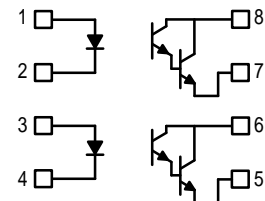
Motorola Preferred Device

**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 |
|--|-----------|-----------------|----------------------------|
| 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 ($I_F = 1.0$ 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, $T_A = 25^\circ\text{C}$) | I_{CEO1} | — | 1.0 | 50 | nA |
| | $(V_{CE} = 5.0$ V, $T_A = 100^\circ\text{C}$) | I_{CEO2} | — | 1.0 | — |
| 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_{CE} | — | 5.5 | — | pF |

COUPLED

| | | | | | | |
|--|---------|----------------------------|-----------|-----------|-----|---------------|
| Output Collector Current ($I_F = 1.0$ mA, $V_{CE} = 5.0$ V) | MOCD223 | 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 | — | — | Vac(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, 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

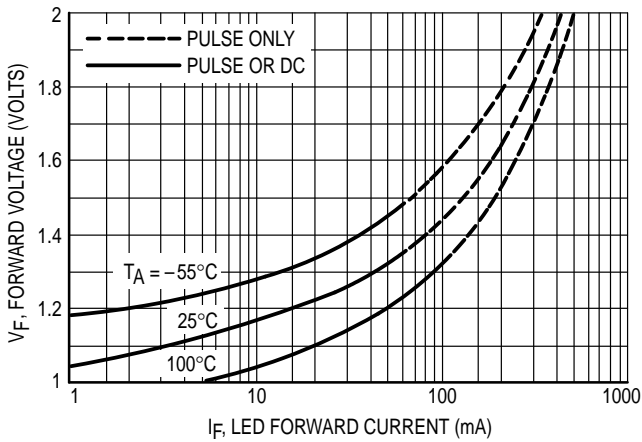


Figure 1. LED Forward Voltage versus Forward Current

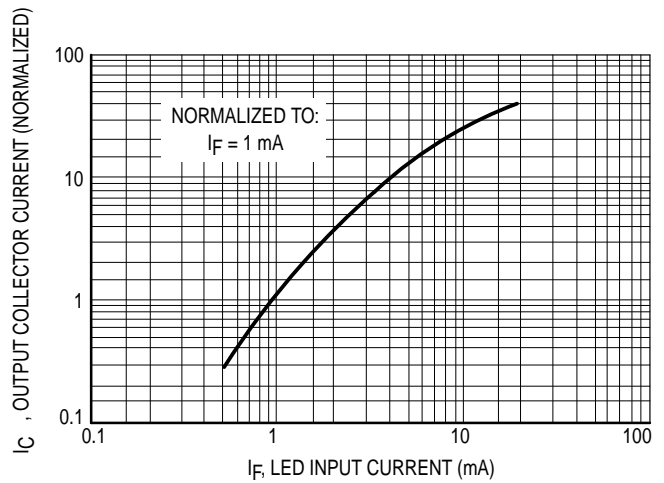


Figure 2. Output Current versus Input Current

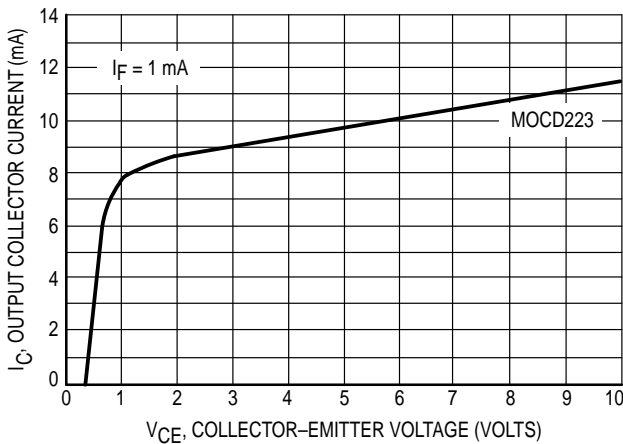


Figure 3. Output Current versus Collector-Emitter Voltage

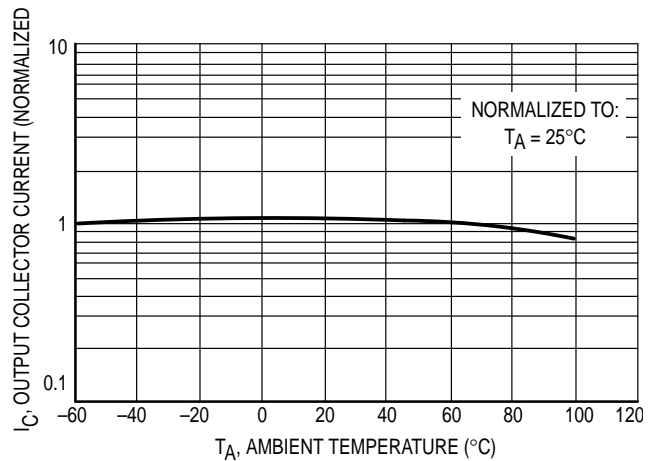


Figure 4. Output Current versus Ambient Temperature

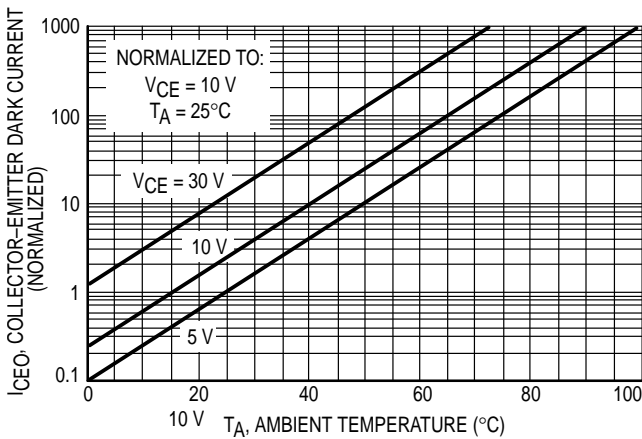


Figure 5. Dark Current versus Ambient Temperature

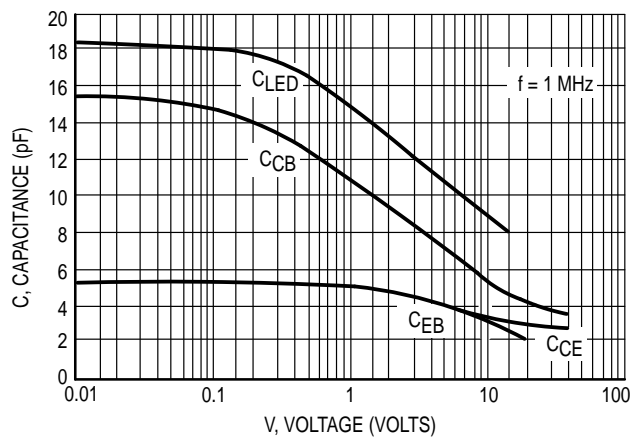
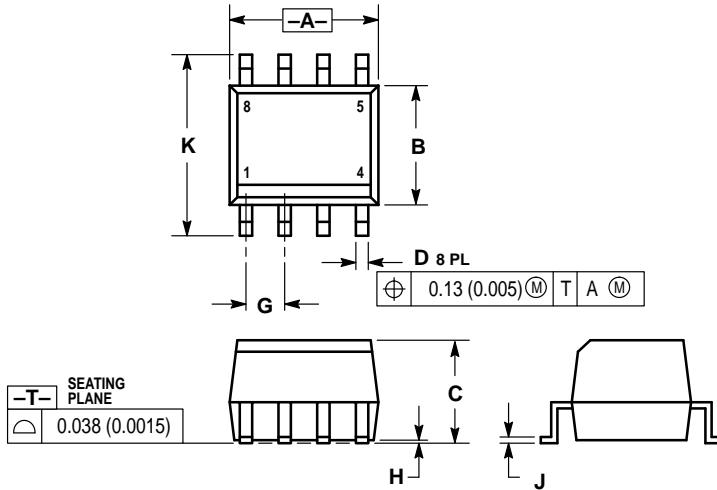


Figure 6. Capacitance versus Voltage

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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