


Small Outline Optoisolators

Transistor Output

These devices consist of a gallium arsenide infrared emitting diode optically coupled to a monolithic silicon phototransistor 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
- Closely Matched Current Transfer Ratios
- Minimum $V_{(BR)CEO}$ of 70 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
- UL Recognized  File #E54915

Ordering Information:

- To obtain MOC205, 206, 207, 208 in Tape and Reel, add R2 suffix to device numbers:
R2 = 2500 units on 13" reel
- To obtain MOC205, 206, 207, 208 in quantities of 50 (shipped in sleeves) — No Suffix

Marking Information:

- MOC205 = 205
- MOC206 = 206
- MOC207 = 207
- MOC208 = 208

Applications:

- Feedback Control Circuits
- Interfacing and coupling systems of different potentials and impedances
- General Purpose Switching Circuits
- Monitor and Detection Circuits

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 | P_D | 90 0.8 | mW mW/ $^\circ\text{C}$ |

OUTPUT TRANSISTOR

| | | | |
|--|-----------|-------------|----------------------------|
| Collector-Emitter Voltage | V_{CEO} | 70 | 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 ≥ 0.5 mm.

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

MOC205

[CTR = 40–80%]

MOC206*

[CTR = 63–125%]

MOC207*

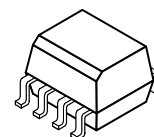
[CTR = 100–200%]

MOC208*

[CTR = 40–125%]

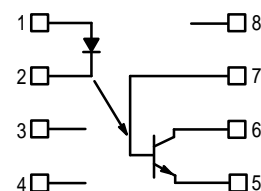
*Motorola Preferred Devices

**SMALL OUTLINE
OPTOISOLATORS
TRANSISTOR 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

MOC205 MOC206 MOC207 MOC208

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 ($I_F = 10\text{ mA}$) | V_F | — | 1.15 | 1.5 | V |
| Reverse Leakage Current ($V_R = 6.0\text{ V}$) | I_R | — | 0.1 | 100 | μA |
| Capacitance | C | — | 18 | — | pF |

OUTPUT TRANSISTOR

| | | | | | |
|---|---------------|-----|-----|----|---------------|
| Collector–Emitter Dark Current ($V_{CE} = 10\text{ V}$, $T_A = 25^\circ\text{C}$) ($V_{CE} = 10\text{ V}$, $T_A = 100^\circ\text{C}$) | I_{CEO1} | — | 1.0 | 50 | nA |
| | I_{CEO2} | — | 1.0 | — | μA |
| Collector–Emitter Breakdown Voltage ($I_C = 100\text{ }\mu\text{A}$) | $V_{(BR)CEO}$ | 70 | 120 | — | V |
| Emitter–Collector Breakdown Voltage ($I_E = 100\text{ }\mu\text{A}$) | $V_{(BR)ECO}$ | 7.0 | 7.8 | — | V |
| Collector–Emitter Capacitance ($f = 1.0\text{ MHz}$, $V_{CE} = 0$) | C_{CE} | — | 7.0 | — | pF |

COUPLED

| | | | | | | |
|--|--------------------------------------|----------------------------|--|--|--|---------------|
| Output Collector Current ($I_F = 10\text{ mA}$, $V_{CE} = 10\text{ V}$) | MOC205 MOC206 MOC207 MOC208 | I_C (CTR) ⁽⁵⁾ | 4.0 (40) 6.3 (63) 10 (100) 4.0 (40) | 6.0 (60) 9.4 (94) 15 (150) 8.0 (80) | 8.0 (80) 12.5 (125) 20 (200) 12.5 (125) | mA (%) |
| Collector–Emitter Saturation Voltage ($I_C = 2.0\text{ mA}$, $I_F = 10\text{ mA}$) | | $V_{CE(sat)}$ | — | 0.15 | 0.4 | V |
| Turn–On Time ($I_C = 2.0\text{ mA}$, $V_{CC} = 10\text{ V}$, $R_L = 100\text{ }\Omega$) | | t_{on} | — | 3.0 | — | μs |
| Turn–Off Time ($I_C = 2.0\text{ mA}$, $V_{CC} = 10\text{ V}$, $R_L = 100\text{ }\Omega$) | | t_{off} | — | 2.8 | — | μs |
| Rise Time ($I_C = 2.0\text{ mA}$, $V_{CC} = 10\text{ V}$, $R_L = 100\text{ }\Omega$) | | t_r | — | 1.6 | — | μs |
| Fall Time ($I_C = 2.0\text{ mA}$, $V_{CC} = 10\text{ V}$, $R_L = 100\text{ }\Omega$) | | t_f | — | 2.2 | — | 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

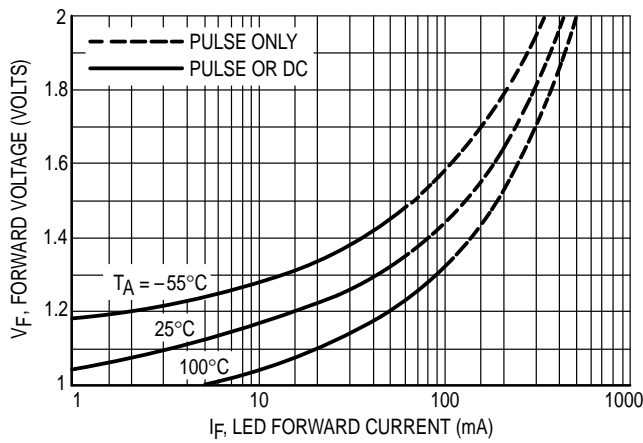


Figure 1. LED Forward Voltage versus Forward Current

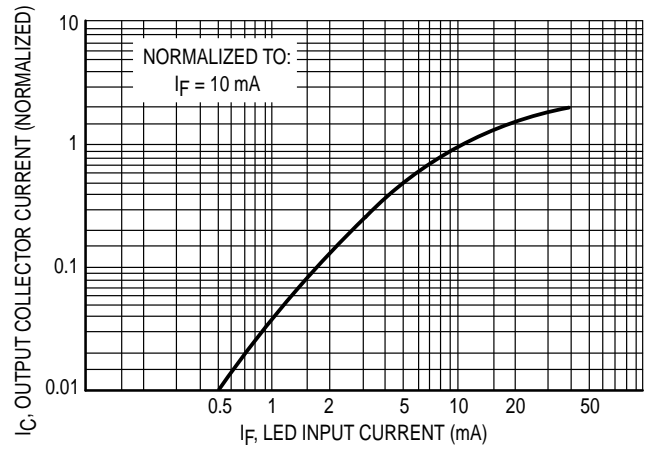


Figure 2. Output Current versus Input Current

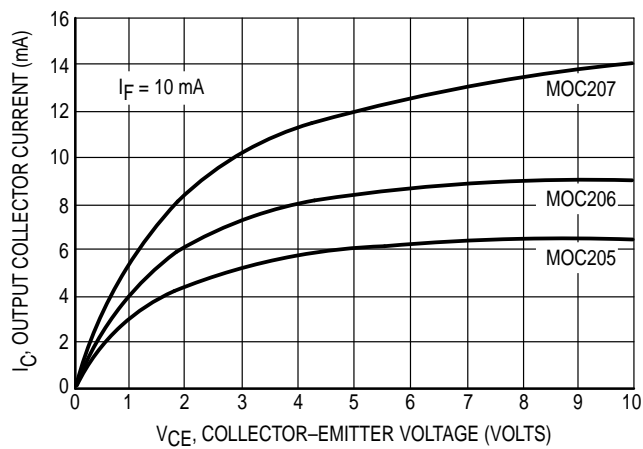


Figure 3. Output Current versus Collector-Emitter Voltage

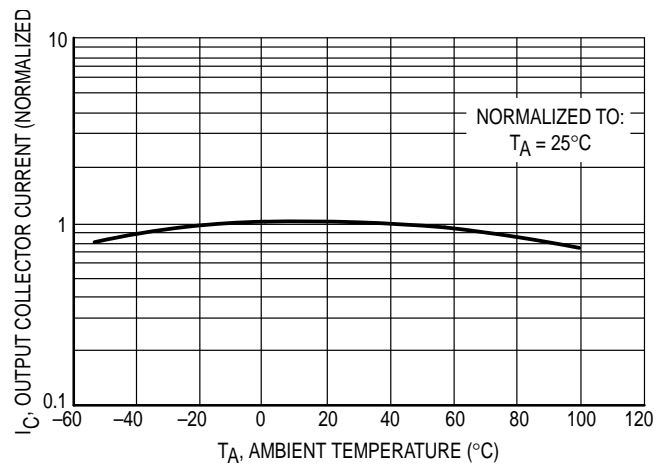


Figure 4. Output Current versus Ambient Temperature

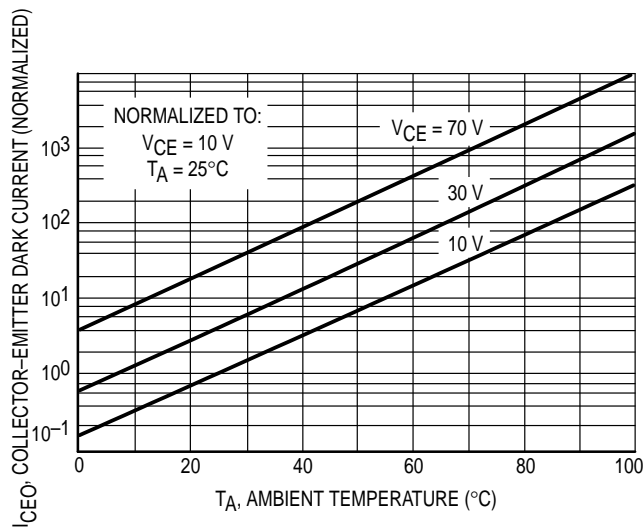


Figure 5. Dark Current versus Ambient Temperature

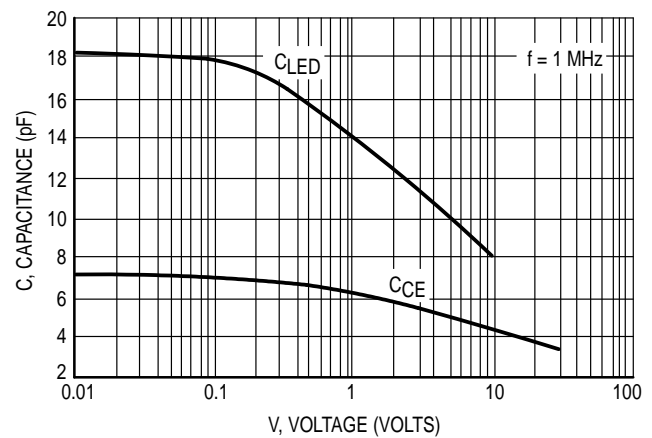
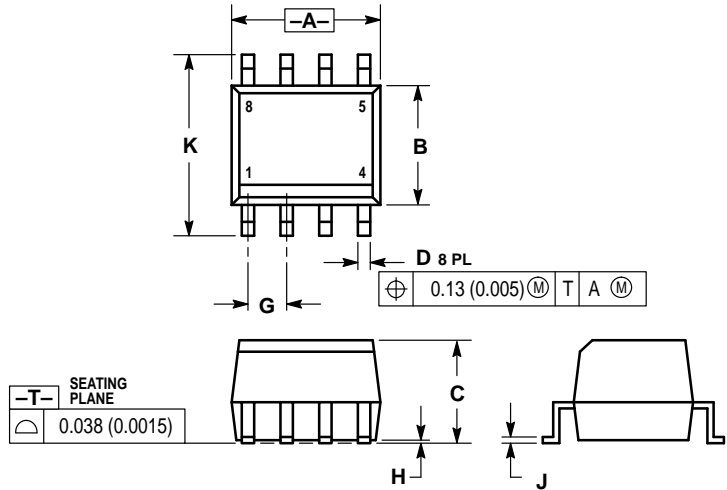


Figure 6. Capacitance versus Voltage

MOC205 MOC206 MOC207 MOC208

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 B

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MOC205/D

