


# 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
<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 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 $25^\circ\text{C}$	$P_D$	150 1.76	mW mW/ $^\circ\text{C}$

NOTE: Thickness through insulation between input and output  $\geq 0.5$  mm.

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

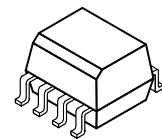
REV 1

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**MOC205**  
[CTR = 40–80%]  
**MOC206\***  
[CTR = 63–125%]  
**MOC207\***  
[CTR = 100–200%]  
**MOC208\***  
[CTR = 40–125%]

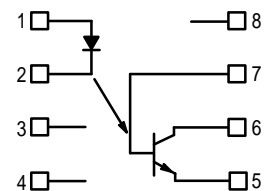
\*Motorola Preferred Devices

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

Characteristic	Symbol	Min	Typ <sup>(4)</sup>	Max	Unit
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## 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	$\mu\text{A}$
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	—	$\mu\text{A}$
Collector–Emitter Breakdown Voltage ( $I_C = 100\ \mu\text{A}$ )	$V_{(BR)CEO}$	70	120	—	V
Emitter–Collector Breakdown Voltage ( $I_E = 100\ \mu\text{A}$ )	$V_{(BR)ECO}$	7.0	7.8	—	V
Collector–Emitter Capacitance ( $f = 1.0\text{ MHz}$ , $V_{CE} = 0$ )	$C_{CE}$	—	7.0	—	pF

## COUPLED

Output Collector Current ( $I_F = 10\text{ mA}$ , $V_{CE} = 10\text{ V}$ )	MOC205 MOC206 MOC207 MOC208	$I_C$ (CTR) <sup>(5)</sup>	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 ( $I_C = 2.0\text{ mA}$ , $V_{CC} = 10\text{ V}$ , $R_L = 100\ \Omega$ )		$t_{on}$	—	3.0	—	$\mu\text{s}$
Turn–Off Time ( $I_C = 2.0\text{ mA}$ , $V_{CC} = 10\text{ V}$ , $R_L = 100\ \Omega$ )		$t_{off}$	—	2.8	—	$\mu\text{s}$
Rise Time ( $I_C = 2.0\text{ mA}$ , $V_{CC} = 10\text{ V}$ , $R_L = 100\ \Omega$ )		$t_r$	—	1.6	—	$\mu\text{s}$
Fall Time ( $I_C = 2.0\text{ mA}$ , $V_{CC} = 10\text{ V}$ , $R_L = 100\ \Omega$ )		$t_f$	—	2.2	—	$\mu\text{s}$
Input–Output Isolation Voltage ( $f = 60\text{ Hz}$ , $t = 1.0\text{ sec.}$ ) <sup>(1,2)</sup>		$V_{ISO}$	3000	—	—	Vac(rms)
Isolation Resistance ( $V_{I-O} = 500\text{ V}$ ) <sup>(2)</sup>		$R_{ISO}$	$10^{11}$	—	—	$\Omega$
Isolation Capacitance ( $V_{I-O} = 0$ , $f = 1.0\text{ MHz}$ ) <sup>(2)</sup>		$C_{ISO}$	—	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

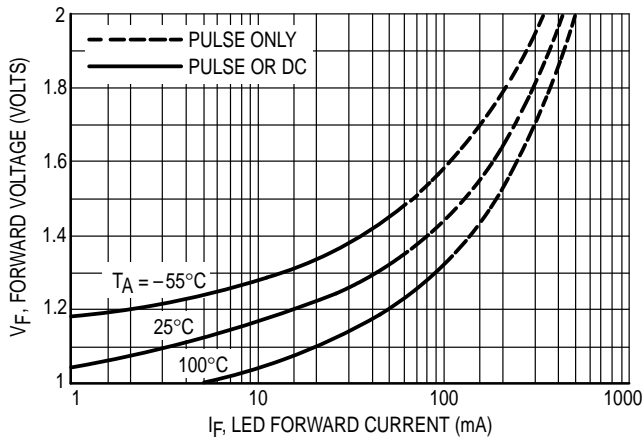


Figure 1. LED Forward Voltage versus Forward Current

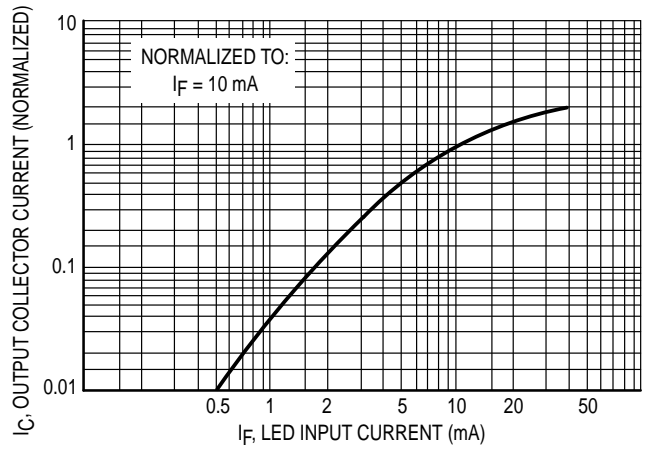


Figure 2. Output Current versus Input Current

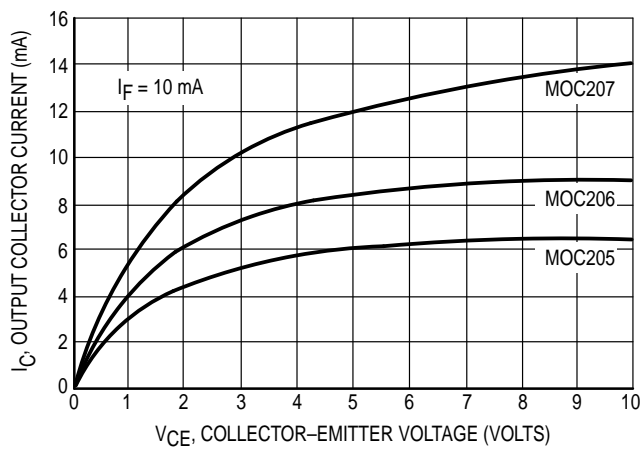


Figure 3. Output Current versus Collector-Emitter Voltage

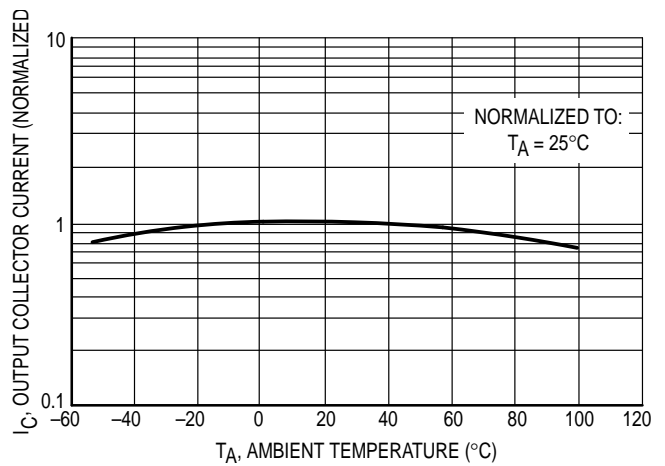


Figure 4. Output Current versus Ambient Temperature

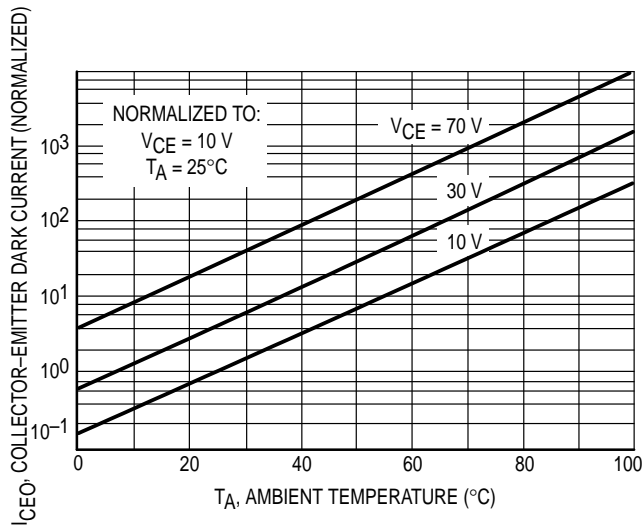


Figure 5. Dark Current versus Ambient Temperature

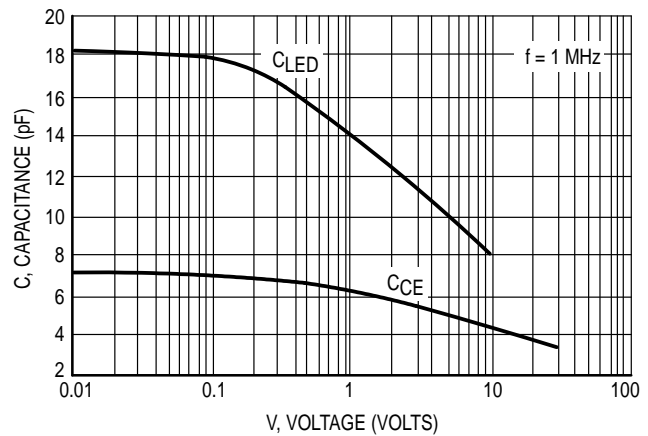
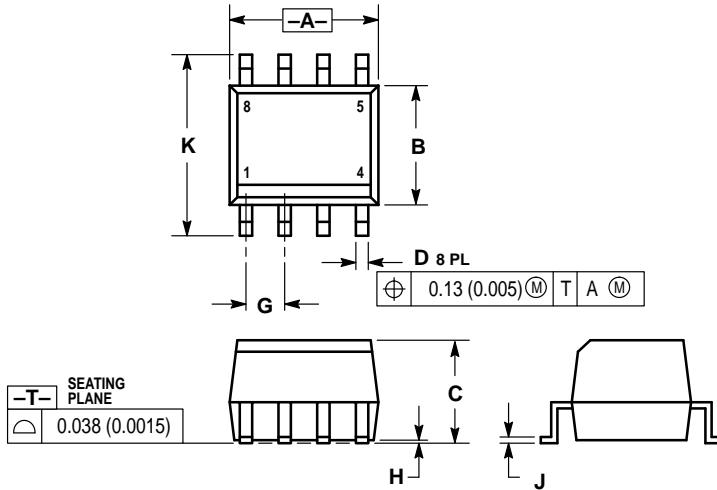


Figure 6. Capacitance versus Voltage

# 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:
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

