

# AC Input Phototransistor Small Outline Surface Mount Optocoupler

The MOC256 is an AC input phototransistor optocoupler. The device consists of two infrared emitters connected in anti-parallel and coupled to a silicon NPN phototransistor detector. They are designed for applications requiring the detection or monitoring of AC signals. These devices are constructed with a standard SOIC-8 footprint.

- Guaranteed Current Transfer Ratio CTR of 20% at  $I_F=10$  mA
- UL Recognized. File Number E54915
- Industry Standard SOIC-8 Surface Mountable Package
- Standard Lead Spacing of 0.050 inches
- Available in Tape and Reel Option (Conforms to EIA Standard RS481A)
- Bidirectional AC Input (Protection Against Reversed DC Bias)
- Guaranteed CTR Symmetry of 2:1 Maximum
- High Input-Output Isolation of 3000 Vac (rms) Guaranteed

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

Rating	Symbol	Value	Unit
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### INPUT LED

Forward Current — Continuous	$I_F$	60	mA
Forward Current — Peak (PW = 100 $\mu\text{s}$ , 120 pps)	$I_F(\text{pk})$	1	A
Reverse Voltage	$V_R$	6	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	$V_{CEO}$	30	V
Emitter-Base Voltage	$V_{ECO}$	7	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/ $^\circ\text{C}$

### TOTAL DEVICE

Input-Output Isolation Voltage <sup>(1)</sup> (60 Hz, 1 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>(2)</sup>	$T_A$	-55 to +100	$^\circ\text{C}$
Storage Temperature Range <sup>(2)</sup>	$T_{stg}$	-55 to +150	$^\circ\text{C}$
Lead Soldering Temperature (10 sec, 1/16" from case)	—	260	$^\circ\text{C}$

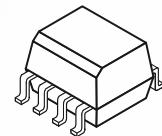
1. Input-output isolation voltage is an internal device dielectric breakdown rating. For this test, Pins 1 and 2 are common, and Pins 5, 6 and 7 are common.
2. Refer to Quality and Reliability Section in Opto Data Book for information on test conditions.

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

## MOC256

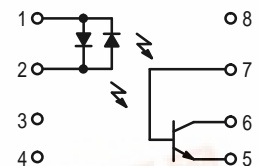
Motorola Preferred Device

SMALL OUTLINE  
 OPTOISOLATORS  
 AC INPUT  
 TRANSISTOR OUTPUT



CASE 846-01, STYLE 2  
 PLASTIC

### SCHEMATIC



- PIN 1. AC IN  
 2. AC IN  
 3. N.C.  
 4. N.C.  
 5. EMITTER  
 6. COLLECTOR  
 7. BASE  
 8. N.C.

## MOC256

### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)<sup>(1)</sup>

Characteristic	Symbol	Min	Typ <sup>(1)</sup>	Max	Unit
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#### INPUT LED

Forward Voltage ( $I_F = 10\text{ mA}$ , either direction)	$V_F$	—	1.15	1.5	Volts
Capacitance ( $V = 0\text{ V}$ , $f = 1\text{ MHz}$ )	$C_J$	—	20	—	pF

#### OUTPUT TRANSISTOR

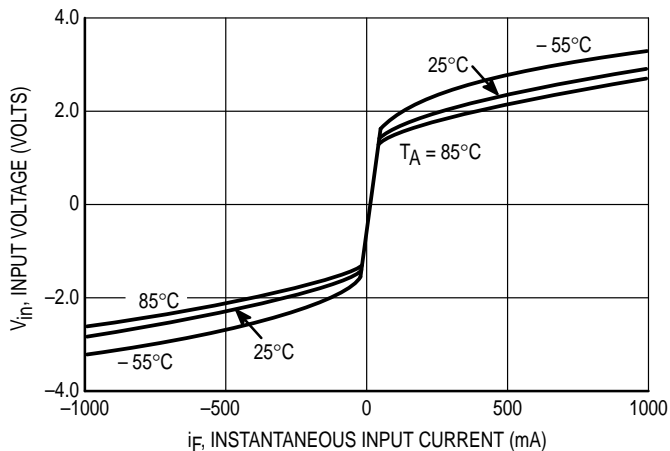
Collector–Emitter Dark Current ( $V_{CE} = 10\text{ V}$ ) $T_A = 100^\circ\text{C}$	$I_{CEO}$	—	1	100	nA
Collector–Base Dark Current ( $V_{CB} = 10\text{ V}$ )	$I_{CBO}$	—	0.2	—	nA
Collector–Emitter Breakdown Voltage ( $I_C = 10\text{ mA}$ )	$V_{(BR)CEO}$	30	45	—	Volts
Collector–Base Breakdown Voltage ( $I_C = 100\text{ }\mu\text{A}$ )	$V_{(BR)CBO}$	70	100	—	Volts
Emitter–Collector Breakdown Voltage ( $I_E = 100\text{ }\mu\text{A}$ )	$V_{(BR)ECO}$	5	7.8	—	Volts
DC Current Gain ( $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ )	$h_{FE}$	—	500	—	—
Collector–Emitter Capacitance ( $f = 1\text{ MHz}$ , $V_{CE} = 0\text{ V}$ )	$C_{CE}$	—	7	—	pF
Collector–Base Capacitance ( $f = 1\text{ MHz}$ , $V_{CB} = 0\text{ V}$ )	$C_{CB}$	—	20	—	pF
Emitter–Base Capacitance ( $f = 1\text{ MHz}$ , $V_{EB} = 0\text{ V}$ )	$C_{EB}$	—	10	—	pF

#### COUPLED

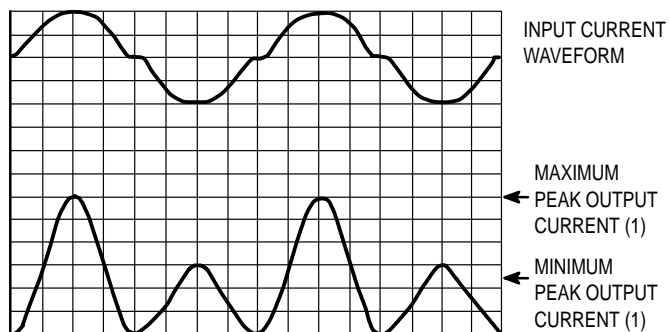
Output Collector Current ( $I_F = \pm 10\text{ mA}$ , $V_{CE} = 10\text{ V}$ )	$I_C$ (CTR) <sup>(5)</sup>	2 (20)	15 (150)	—	mA (%)
Output Collector Current Symmetry <sup>(3)</sup> $\left( \begin{array}{l} I_C \text{ at } I_F = +10\text{ mA}, V_{CE} = 10\text{ V} \\ I_C \text{ at } I_F = -10\text{ mA}, V_{CE} = 10\text{ V} \end{array} \right)$	—	0.5	1.0	2.0	—
Collector–Emitter Saturation Voltage ( $I_C = 0.5\text{ mA}$ , $I_F = \pm 10\text{ mA}$ )	$V_{CE(sat)}$	—	0.1	0.4	Volts
Input–Output Isolation Voltage ( $f = 60\text{ Hz}$ , $t = 1\text{ sec}$ ) <sup>(4,5)</sup>	$V_{ISO}$	3000	—	—	Vac(rms)
Isolation Resistance ( $V = 500\text{ V}$ ) <sup>(5)</sup>	$R_{ISO}$	$10^{11}$	—	—	$\Omega$
Isolation Capacitance ( $V = 0\text{ V}$ , $f = 1\text{ MHz}$ ) <sup>(5)</sup>	$C_{ISO}$	—	0.2	—	pF

1. Always design to the specified minimum/maximum electrical limits (where applicable).
2. Current Transfer Ratio (CTR) =  $I_C/I_F \times 100\%$ .
3. This specification guarantees that the higher of the two  $I_C$  readings will be no more than 3 times the lower at  $I_F = 10\text{ mA}$ .
4. Input–Output Isolation Voltage,  $V_{ISO}$ , is an internal device dielectric breakdown rating.
5. For this test, pins 1 and 2 are common, and pins 5, 6 and 7 are common.

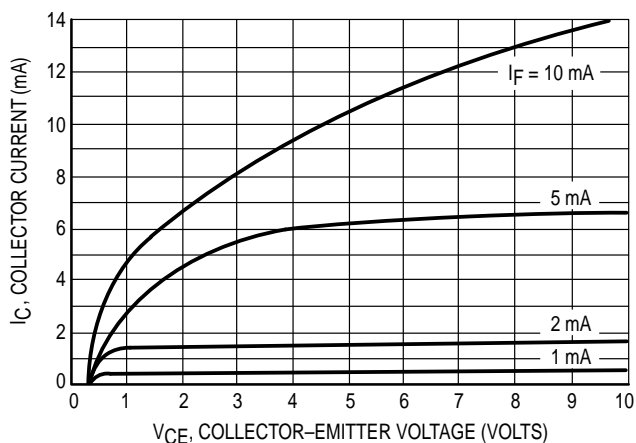
**TYPICAL CHARACTERISTICS**



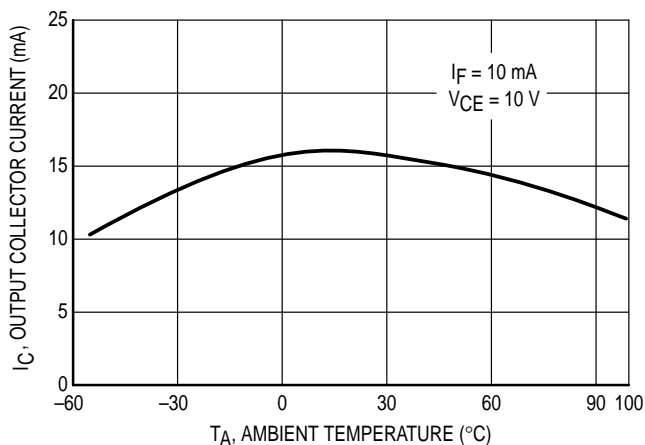
**Figure 1. Input Voltage versus Input Current**



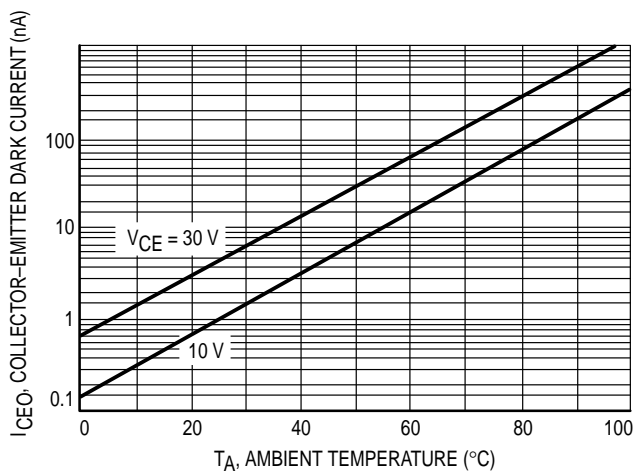
**Figure 2. Output Characteristics**



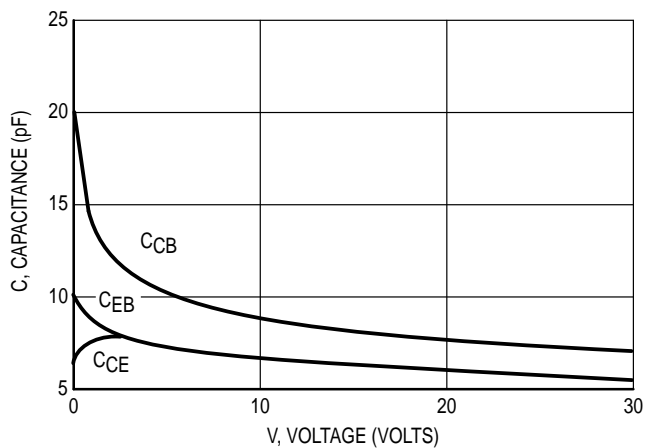
**Figure 3. Collector Current versus Collector-Emitter Voltage**



**Figure 4. Output Current versus Ambient Temperature**



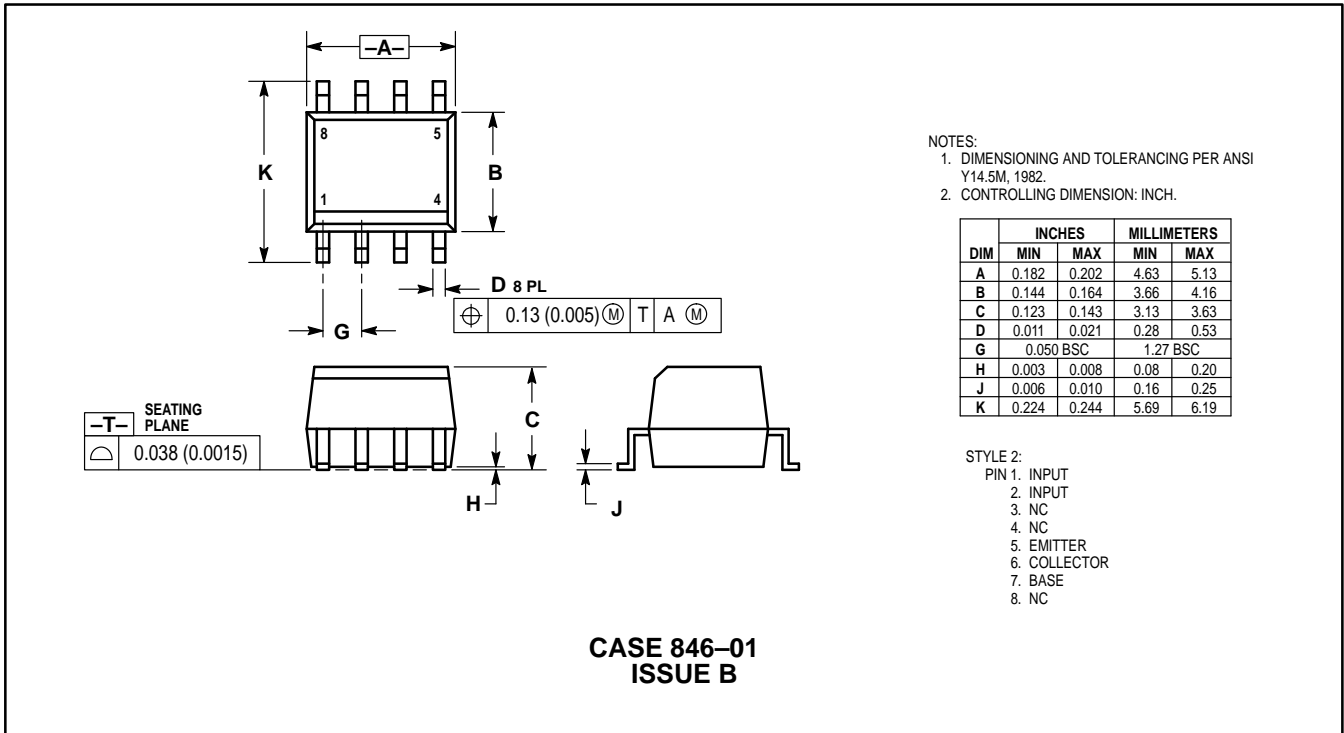
**Figure 5. Dark Current versus Ambient Temperature**



**Figure 6. Capacitances versus Voltage**

# MOC256

## PACKAGE DIMENSIONS



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