# AC Input Phototransistor Small Outline Surface Mount Optocoupler

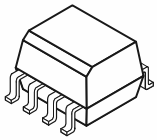
**MOC256**

**Motorola Preferred Device**

**SMALL OUTLINE OPTOISOLATORS AC INPUT TRANSISTOR OUTPUT**

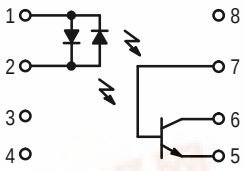
The MOC256 is an AC input phototransistor optocoupler. The device consists of two infrared emitters connected in anti–parallel and coupled to a silicon NPN phototransistor detector. They are designed for applications requiring the detection or monitoring of AC signals. These devices are constructed with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



**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.

**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 | A |
| Reverse Voltage | $V_R$ | 6 | V |
| LED Power Dissipation @ $T_A$ = 25°C<br>Derate above 25°C | $P_D$ | 90<br>0.8 | mW<br>mW/°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°C<br>Derate above 25°C | $P_D$ | 150<br>1.76 | mW<br>mW/°C |
| **TOTAL DEVICE** | | | |
| Input–Output Isolation Voltage(1)<br>(60 Hz, 1 sec Duration) | $V_{ISO}$ | 3000 | Vac(rms) |
| Total Device Power Dissipation @ $T_A$ = 25°C<br>Derate above 25°C | $P_D$ | 250<br>2.94 | mW<br>mW/°C |
| Ambient Operating Temperature Range(2) | $T_A$ | –55 to +100 | °C |
| Storage Temperature Range(2) | $T_{stg}$ | –55 to +150 | °C |
| Lead Soldering Temperature (10 sec, 1/16″ from case) | — | 260 | °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 ≥ 0.5 mm.

# MOC256

**ELECTRICAL CHARACTERISTICS** ($T_A$ = 25°C unless otherwise noted)(1)

| Characteristic | Symbol | Min | Typ(1) | Max | Unit |
|---|---|---|---|---|---|
| **INPUT LED** | | | | | |
| Forward Voltage ($I_F$ = 10 mA, either direction) | $V_F$ | — | 1.15 | 1.5 | Volts |
| Capacitance (V = 0 V, f = 1 MHz) | $C_J$ | — | 20 | — | pF |
| **OUTPUT TRANSISTOR** | | | | | |
| Collector–Emitter Dark Current ($V_{CE}$ = 10 V) | $I_{CEO}$ | — | 1 | 100 | nA |
| $T_A$ = 100°C | | — | 1 | — | μA |
| Collector–Base Dark Current ($V_{CB}$ = 10 V) | $I_{CBO}$ | — | 0.2 | — | nA |
| Collector–Emitter Breakdown Voltage ($I_C$ = 10 mA) | $V_{(BR)CEO}$ | 30 | 45 | — | Volts |
| Collector–Base Breakdown Voltage ($I_C$ = 100 μA) | $V_{(BR)CBO}$ | 70 | 100 | — | Volts |
| Emitter–Collector Breakdown Voltage ($I_E$ = 100 μA) | $V_{(BR)ECO}$ | 5 | 7.8 | — | Volts |
| DC Current Gain ($I_C$ = 2 mA, $V_{CE}$ = 5 V) | $h_{FE}$ | — | 500 | — | — |
| Collector–Emitter Capacitance (f = 1 MHz, $V_{CE}$ = 0 V) | $C_{CE}$ | — | 7 | — | pF |
| Collector–Base Capacitance (f = 1 MHz, $V_{CB}$ = 0 V) | $C_{CB}$ | — | 20 | — | pF |
| Emitter–Base Capacitance (f = 1 MHz, $V_{EB}$ = 0 V) | $C_{EB}$ | — | 10 | — | pF |
| **COUPLED** | | | | | |
| Output Collector Current ($I_F$ = ±10 mA, $V_{CE}$ = 10 V) | $I_C$ (CTR)(5) | 2 (20) | 15 (150) | — | mA (%) |
| Output Collector Current Symmetry(3) $\left(\frac{I_C \text{ at } I_F = +10 \text{ mA}, V_{CE} = 10 \text{ V}}{I_C \text{ at } I_F = -10 \text{ mA}, V_{CE} = 10 \text{ V}}\right)$ | — | 0.5 | 1.0 | 2.0 | — |
| Collector–Emitter Saturation Voltage ($I_C$ = 0.5 mA, $I_F$ = ±10 mA) | $V_{CE(sat)}$ | — | 0.1 | 0.4 | Volts |
| Input–Output Isolation Voltage (f = 60 Hz, t = 1 sec)(4,5) | $V_{ISO}$ | 3000 | — | — | Vac(rms) |
| Isolation Resistance (V = 500 V)(5) | $R_{ISO}$ | $10^{11}$ | — | — | Ω |
| Isolation Capacitance (V = 0 V, f = 1 MHz)(5) | $C_{ISO}$ | — | 0.2 | — | pF |

1. Always design to the specified minimum/maximum electrical limits (where applicable).
2. Current Transfer Ratio (CTR) = $I_C/I_F$ x 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 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

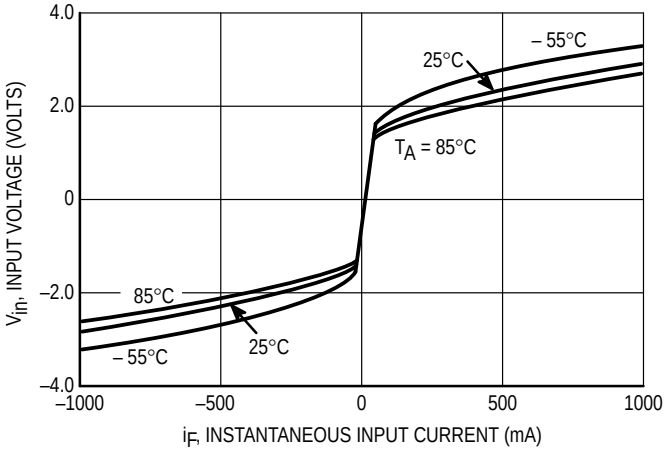



**Figure 1. Input Voltage versus Input Current**

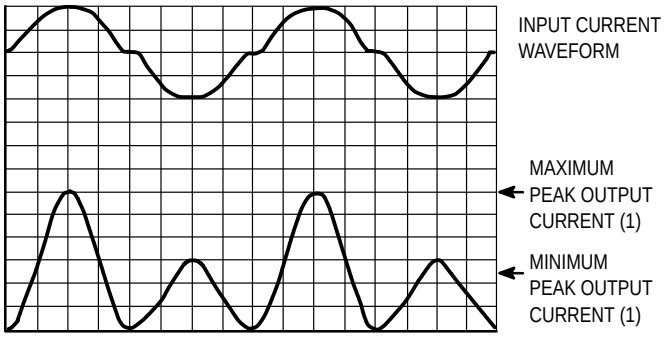



**Figure 2. Output Characteristics**

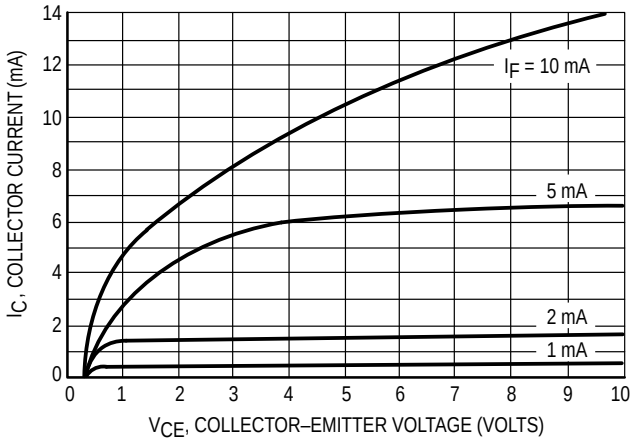



**Figure 3. Collector Current versus Collector–Emitter Voltage**

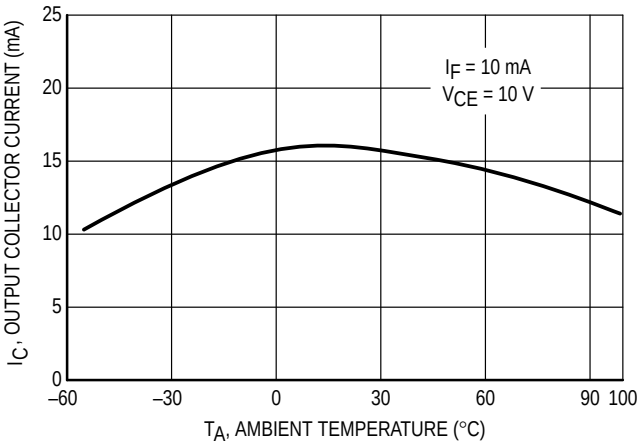



**Figure 4. Output Current versus Ambient Temperature**

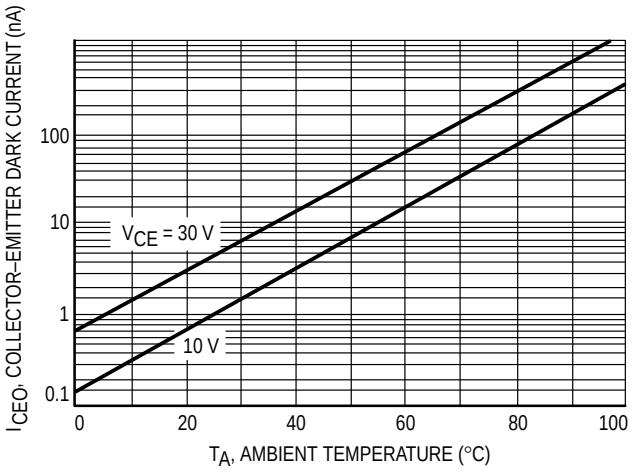



**Figure 5. Dark Current versus Ambient Temperature**

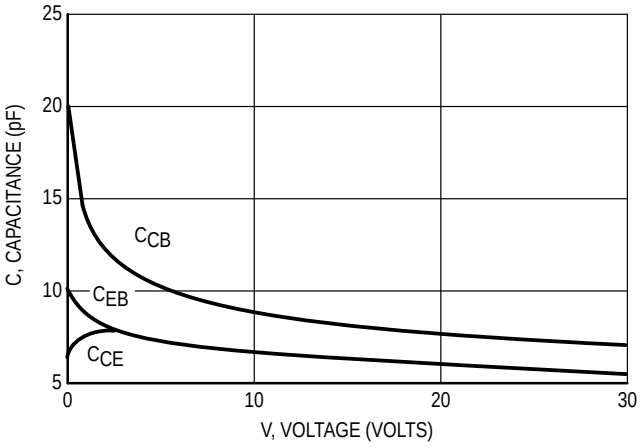
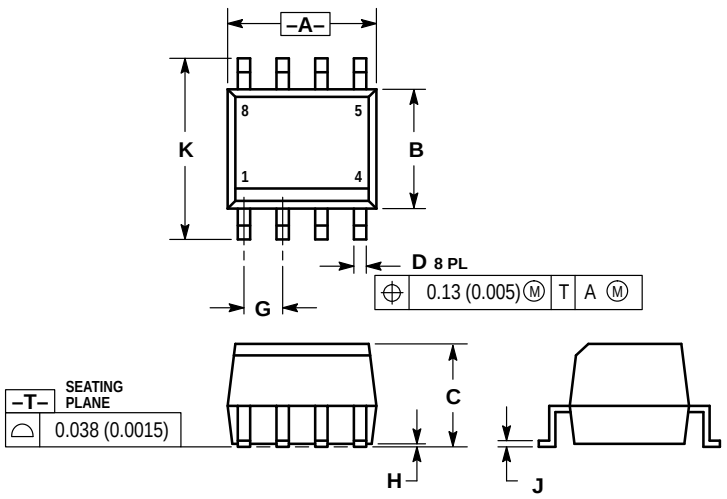



**Figure 6. Capacitances versus Voltage**

## PACKAGE DIMENSIONS




NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

| | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| DIM | 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 2:
PIN 1. INPUT
2. INPUT
3. NC
4. NC
5. EMITTER
6. COLLECTOR
7. BASE
8. NC

**CASE 846–01**
**ISSUE B**



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