



# 6-Pin DIP Optoisolators for Power Supply Applications (No Base Connection)

The MOC8101, MOC8102, MOC8103, MOC8104 and MOC8105 devices consist of a gallium arsenide LED optically coupled to a silicon phototransistor in a dual-in-line package.

- Closely Matched Current Transfer Ratio (CTR) Minimizes Unit-to-Unit Variation
- Narrow (CTR) Windows that translate to a Narrow and Predictable Open Loop Gain Window
- Very Low Coupled Capacitance along with No Chip to Pin 6 Base Connection for Minimum Noise Susceptibility
- **To order devices that are tested and marked per VDE 0884 requirements, the suffix "V" must be included at end of part number. VDE 0884 is a test option.**

### Applications

- Switchmode Power Supplies (Feedback Control)
- AC Line/Digital Logic Isolation
- Interfacing and coupling systems of different potentials and impedances

### MAXIMUM RATINGS (T<sub>A</sub> = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
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#### INPUT LED

Forward Current — Continuous	I <sub>F</sub>	60	mA
Forward Current — Peak (PW = 100 μs, 120 pps)	I <sub>F(pk)</sub>	1	A
Reverse Voltage	V <sub>R</sub>	6	Volts
LED Power Dissipation @ T <sub>A</sub> = 25°C Derate above 25°C	P <sub>D</sub>	120 1.41	mW mW/°C

#### OUTPUT TRANSISTOR

Collector–Emitter Voltage	V <sub>CEO</sub>	30	Volts
Emitter–Collector Voltage	V <sub>ECO</sub>	7	Volts
Collector Current — Continuous	I <sub>C</sub>	150	mA
Detector Power Dissipation @ T <sub>A</sub> = 25°C Derate above 25°C	P <sub>D</sub>	150 1.76	mW mW/°C

#### TOTAL DEVICE

Input–Output Isolation Voltage <sup>(1)</sup> (f = 60 Hz, t = 1 sec.)	V <sub>ISO</sub>	7500	Vac(pk)
Total Device Power Dissipation @ T <sub>A</sub> = 25°C Derate above 25°C	P <sub>D</sub>	250 2.94	mW mW/°C
Ambient Operating Temperature Range <sup>(2)</sup>	T <sub>A</sub>	–55 to +100	°C
Storage Temperature Range <sup>(2)</sup>	T <sub>stg</sub>	–55 to +150	°C
Lead Soldering Temperature (1/16" from case, 10 sec. duration)	T <sub>L</sub>	260	°C

1. Input–Output Isolation Voltage, V<sub>ISO</sub>, is an internal device dielectric breakdown rating. For this test, Pins 1 and 2 are common, and Pins 4 and 5 are common.
2. Refer to Quality and Reliability Section in Opto Data Book for information on test conditions.

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

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REV 1

**MOC8101**

[CTR = 50–80%]

**MOC8102**

[CTR = 73–117%]

**MOC8103**

[CTR = 108–173%]

**MOC8104**

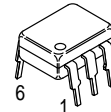
[CTR = 160–256%]

**MOC8105\***

[CTR = 65–133%]

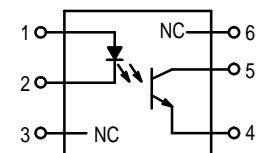
\*Motorola Preferred Device

### STYLE 3 PLASTIC



STANDARD THRU HOLE  
CASE 730A-04

### SCHEMATIC



- PIN 1. ANODE  
2. CATHODE  
3. NO CONNECTION  
4. EMITTER  
5. COLLECTOR  
6. NO CONNECTION

# MOC8101 MOC8102 MOC8103 MOC8104 MOC8105

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

Characteristic	Symbol	Min	Typ <sup>(1)</sup>	Max	Unit
<b>INPUT LED</b>					
Forward Voltage ( $I_F = 10\text{ mA}$ )	$V_F$	1.0	1.15	1.5	V
Reverse Leakage Current ( $V_R = 5.0\text{ V}$ )	$I_R$	—	0.05	10	$\mu\text{A}$
Capacitance	C	—	18	—	pF

## OUTPUT TRANSISTOR

Collector–Emitter Dark Current ( $V_{CE} = 10\text{ V}$ , $T_A = 25^\circ\text{C}$ )	$I_{CEO1}$	—	1.0	50	nA
	$I_{CEO2}$	—	1.0	—	$\mu\text{A}$
Collector–Emitter Breakdown Voltage ( $I_C = 1.0\text{ mA}$ )	$V_{(BR)CEO}$	30	45	—	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 ( $I_F = 10\text{ mA}$ , $V_{CE} = 10\text{ V}$ )	MOC8101 MOC8102 MOC8103 MOC8104 MOC8105	$I_C$ (CTR) <sup>(2)</sup>	5.0 (50) 7.3 (73) 10.8 (108) 16 (160) 6.5 (65)	6.5 (65) 9.0 (90) 14 (140) 20 (200) 10 (100)	8.0 (80) 11.7 (117) 17.3 (173) 25.6 (256) 13.3 (133)	mA (%)
Collector–Emitter Saturation Voltage ( $I_C = 500\ \mu\text{A}$ , $I_F = 5.0\text{ mA}$ )		$V_{CE(sat)}$	—	0.15	0.4	V
Turn–On Time ( $I_C = 2.0\text{ mA}$ , $V_{CC} = 10\text{ V}$ , $R_L = 100\ \Omega$ ) <sup>(3)</sup>		$t_{on}$	—	7.5	20	$\mu\text{s}$
Turn–Off Time ( $I_C = 2.0\text{ mA}$ , $V_{CC} = 10\text{ V}$ , $R_L = 100\ \Omega$ ) <sup>(3)</sup>		$t_{off}$	—	5.7	20	$\mu\text{s}$
Rise Time ( $I_C = 2.0\text{ mA}$ , $V_{CC} = 10\text{ V}$ , $R_L = 100\ \Omega$ ) <sup>(3)</sup>		$t_r$	—	3.2	—	$\mu\text{s}$
Fall Time ( $I_C = 2.0\text{ mA}$ , $V_{CC} = 10\text{ V}$ , $R_L = 100\ \Omega$ ) <sup>(3)</sup>		$t_f$	—	4.7	—	$\mu\text{s}$
Isolation Voltage ( $f = 60\text{ Hz}$ , $t = 1.0\text{ sec.}$ ) <sup>(4)</sup>		$V_{ISO}$	7500	—	—	Vac(pk)
Isolation Resistance ( $V_{I-O} = 500\text{ V}$ ) <sup>(4)</sup>		$R_{ISO}$	$10^{11}$	—	—	$\Omega$
Isolation Capacitance ( $V_{I-O} = 0$ , $f = 1.0\text{ MHz}$ ) <sup>(4)</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. For test circuit setup and waveforms, refer to Figure 7.
4. For this test, Pins 1 and 2 are common, and Pins 4 and 5 are common.

## TYPICAL CHARACTERISTICS

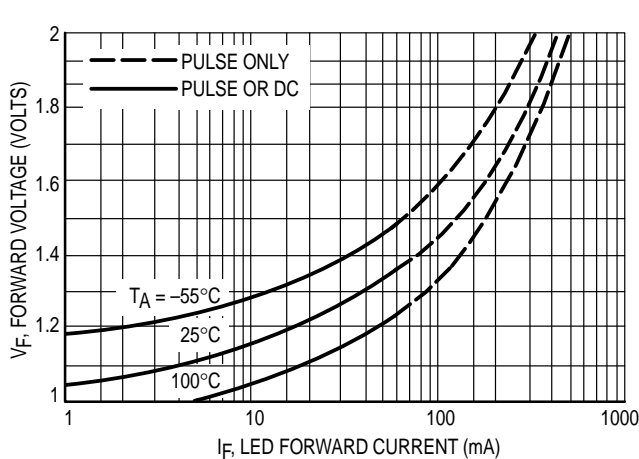


Figure 1. LED Forward Voltage versus Forward Current

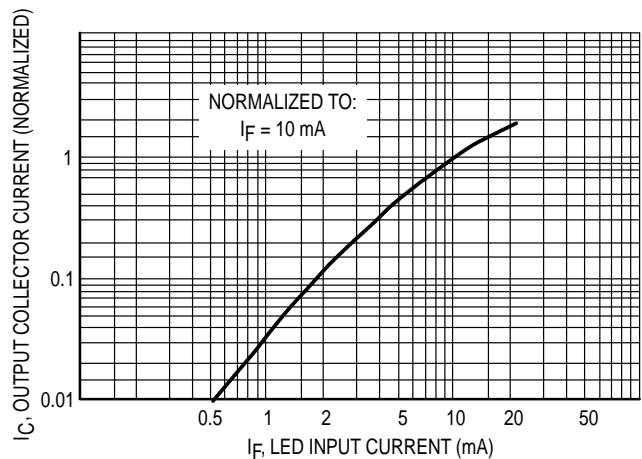


Figure 2. Output Current versus Input Current

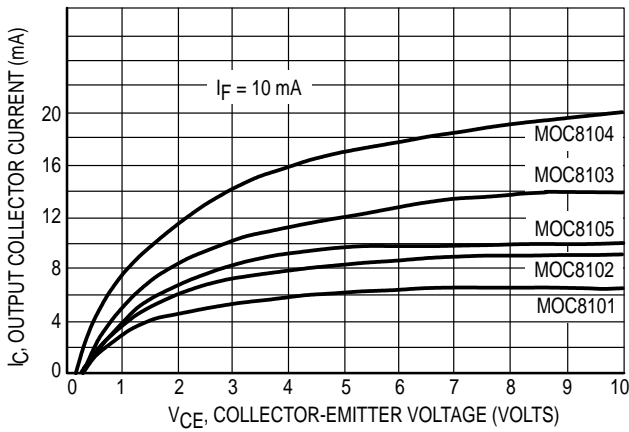


Figure 3. Collector Current versus Collector-Emitter Voltage

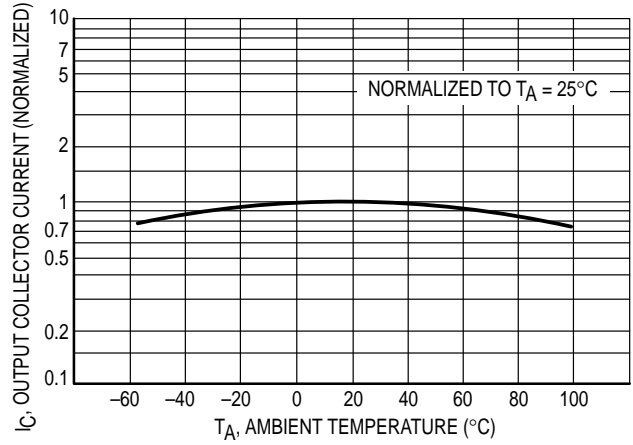


Figure 4. Output Current versus Ambient Temperature

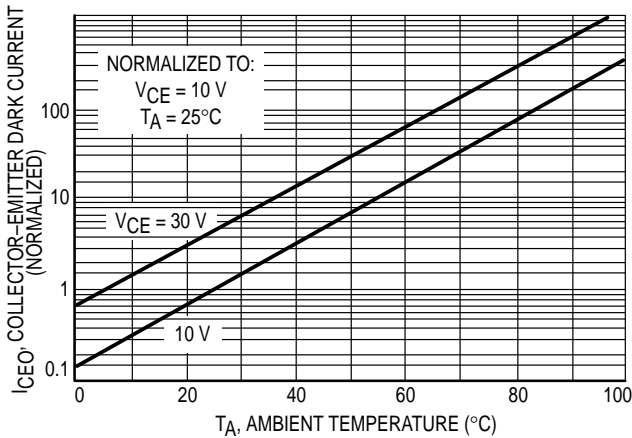


Figure 5. Dark Current versus Ambient Temperature

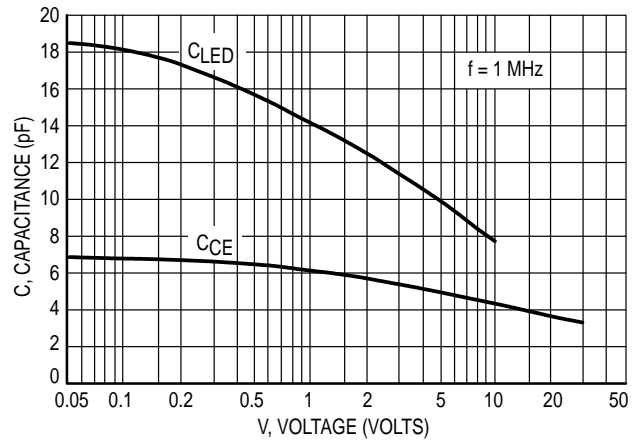


Figure 6. Capacitance versus Voltage

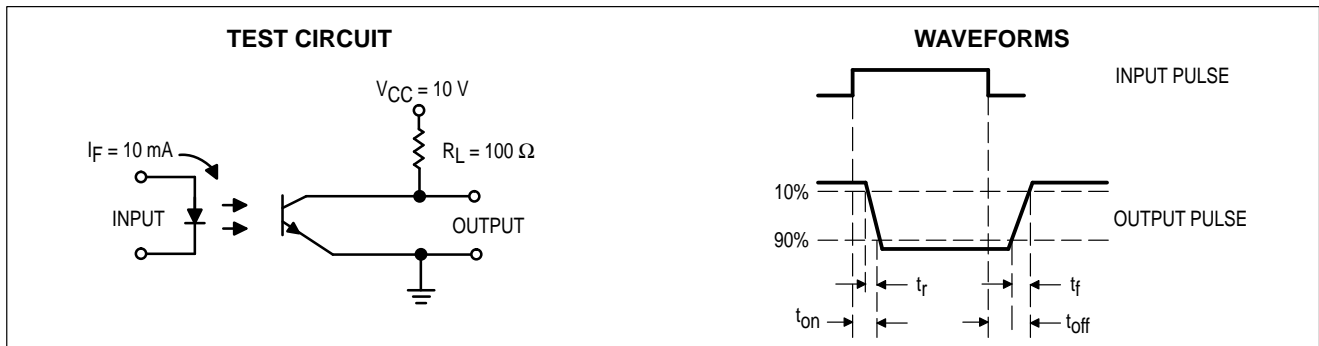
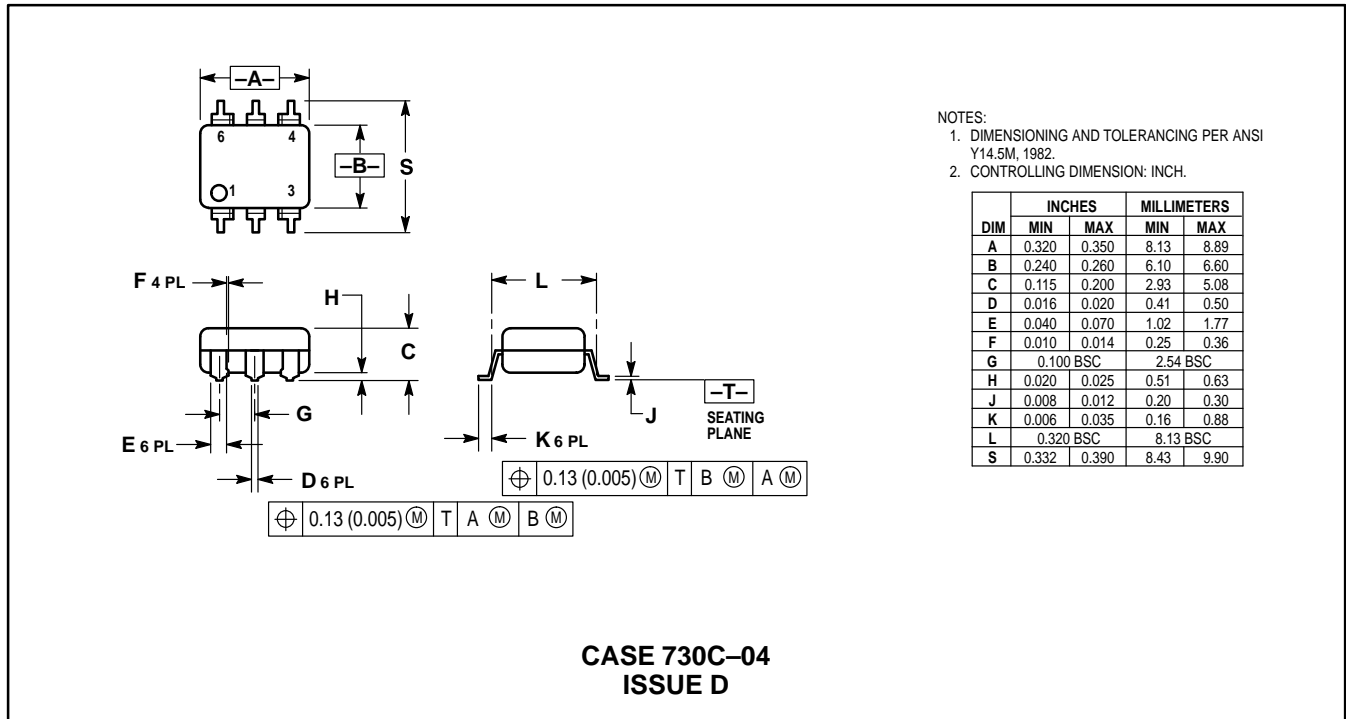
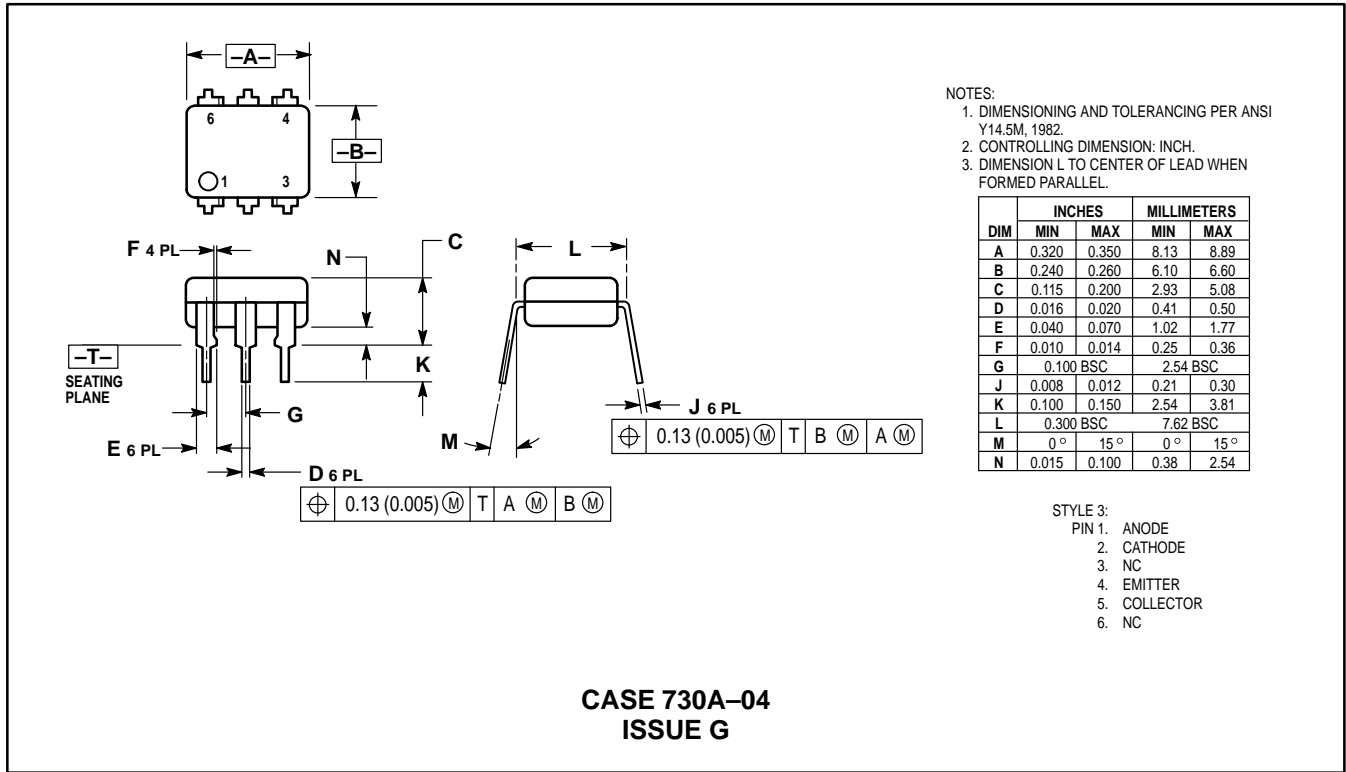


Figure 7. Switching Time Test Circuit and Waveforms

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# MOC8101 MOC8102 MOC8103 MOC8104 MOC8105

## PACKAGE DIMENSIONS



**How to reach us:**

USA/EUROPE: Motorola Literature Distribution;  
 P.O. Box 20912; Phoenix, Arizona 85036. 1-800-441-2447

MFAX: RMFA00@email.sps.mot.com – TOUCHTONE (602) 244-6609  
 INTERNET: http://Design-NET.com

JAPAN: Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, Toshikatsu Otsuki,  
 6F Seibu-Butsuryu-Center, 3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 03-3521-8315

HONG KONG: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,  
 51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298

