



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_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	Volts
LED Power Dissipation @ T _A = 25°C Derate above 25°C	P _D	120 1.41	mW mW/°C

OUTPUT TRANSISTOR

Collector–Emitter Voltage	V _{CEO}	30	Volts
Emitter–Collector Voltage	V _{ECO}	7	Volts
Collector Current — Continuous	I _C	150	mA
Detector Power Dissipation @ T _A = 25°C Derate above 25°C	P _D	150 1.76	mW mW/°C

TOTAL DEVICE

Input–Output Isolation Voltage ⁽¹⁾ (f = 60 Hz, t = 1 sec.)	V _{ISO}	7500	Vac(pk)
Total Device Power Dissipation @ T _A = 25°C Derate above 25°C	P _D	250 2.94	mW 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 (1/16" from case, 10 sec. duration)	T _L	260	°C

1. Input–Output Isolation Voltage, V_{ISO}, 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. GlobalOptoisolator is a trademark of Motorola, Inc.

REV 1

MOC8101

[CTR = 50–80%]

MOC8102

[CTR = 73–117%]

MOC8103

[CTR = 108–173%]

MOC8104

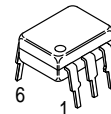
[CTR = 160–256%]

MOC8105*

[CTR = 65–133%]

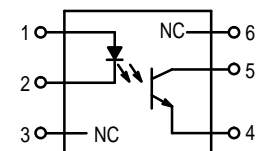
*Motorola Preferred Device

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)⁽¹⁾

Characteristic	Symbol	Min	Typ ⁽¹⁾	Max	Unit
INPUT LED					
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	μA
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	—	μA
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) ⁽²⁾	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 ($I_C = 2.0\text{ mA}$, $V_{CC} = 10\text{ V}$, $R_L = 100\ \Omega$) ⁽³⁾		t_{on}	—	7.5	20	μs
Turn–Off Time ($I_C = 2.0\text{ mA}$, $V_{CC} = 10\text{ V}$, $R_L = 100\ \Omega$) ⁽³⁾		t_{off}	—	5.7	20	μs
Rise Time ($I_C = 2.0\text{ mA}$, $V_{CC} = 10\text{ V}$, $R_L = 100\ \Omega$) ⁽³⁾		t_r	—	3.2	—	μs
Fall Time ($I_C = 2.0\text{ mA}$, $V_{CC} = 10\text{ V}$, $R_L = 100\ \Omega$) ⁽³⁾		t_f	—	4.7	—	μs
Isolation Voltage ($f = 60\text{ Hz}$, $t = 1.0\text{ sec.}$) ⁽⁴⁾		V_{ISO}	7500	—	—	Vac(pk)
Isolation Resistance ($V_{I-O} = 500\text{ V}$) ⁽⁴⁾		R_{ISO}	10^{11}	—	—	Ω
Isolation Capacitance ($V_{I-O} = 0$, $f = 1.0\text{ MHz}$) ⁽⁴⁾		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

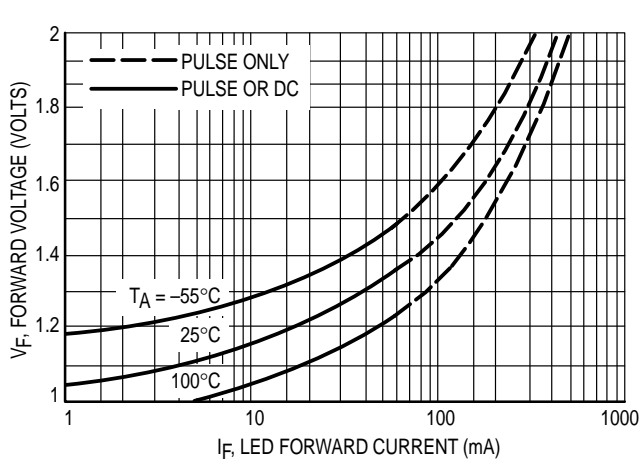


Figure 1. LED Forward Voltage versus Forward Current

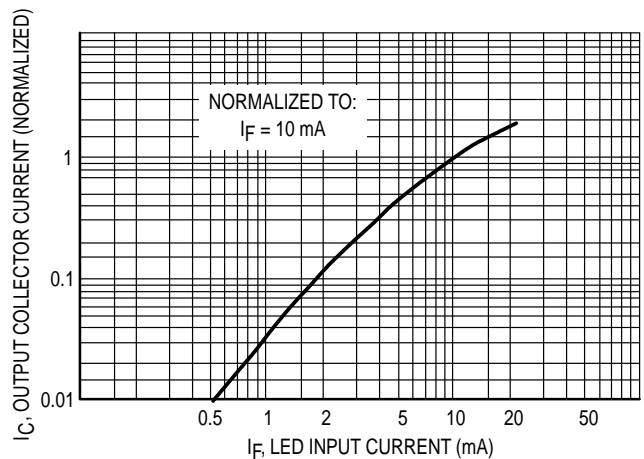


Figure 2. Output Current versus Input Current

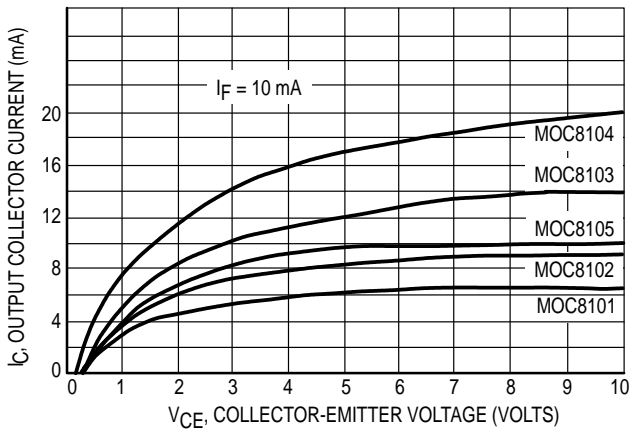


Figure 3. Collector Current versus Collector-Emitter Voltage

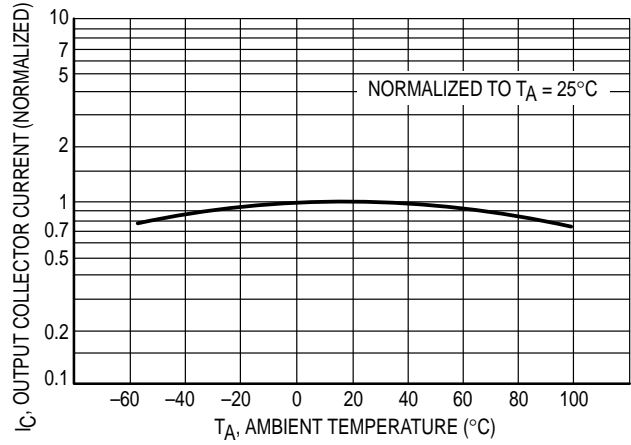


Figure 4. Output Current versus Ambient Temperature

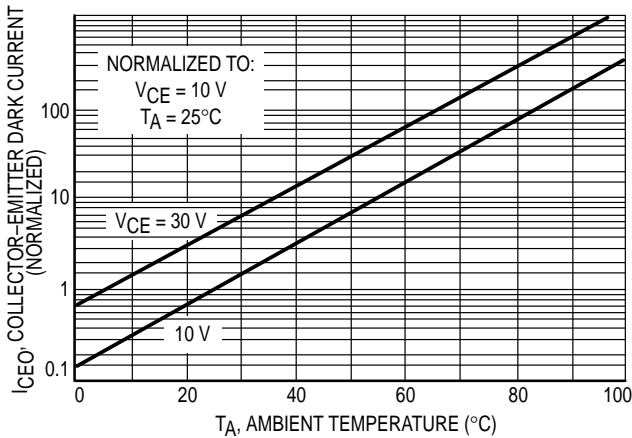


Figure 5. Dark Current versus Ambient Temperature

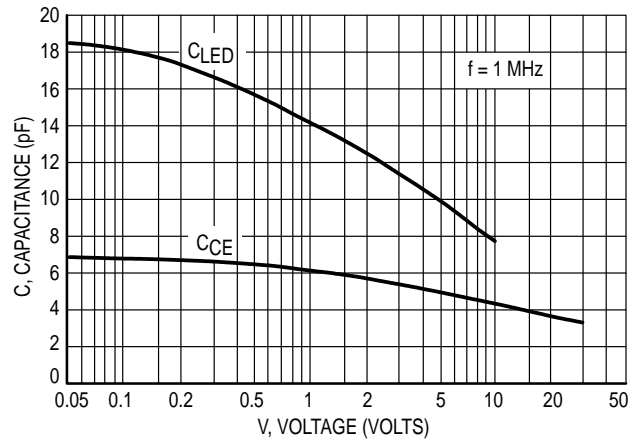


Figure 6. Capacitance versus Voltage

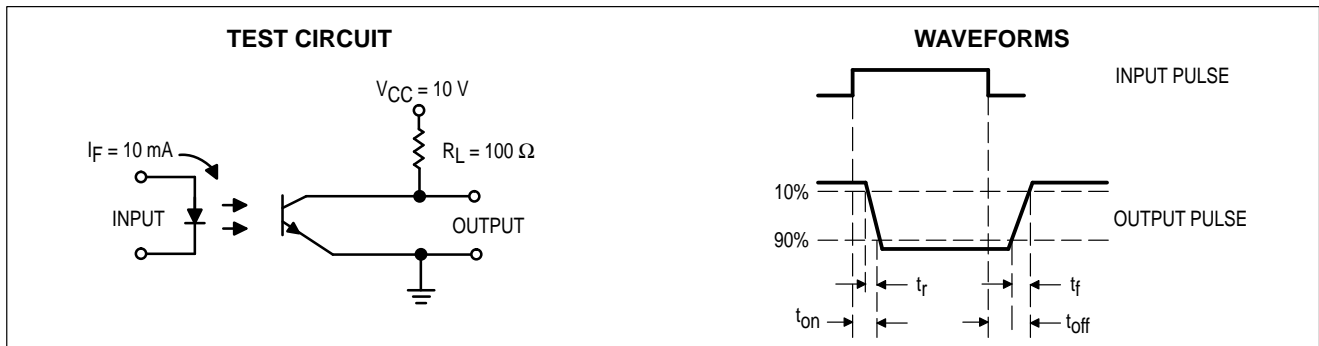


Figure 7. Switching Time Test Circuit and Waveforms

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters can and do vary in different applications. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

MOC8101 MOC8102 MOC8103 MOC8104 MOC8105

PACKAGE DIMENSIONS

SEATING PLANE

Notes:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.320	0.350	8.13	8.89
B	0.240	0.260	6.10	6.60
C	0.115	0.200	2.93	5.08
D	0.016	0.020	0.41	0.50
E	0.040	0.070	1.02	1.77
F	0.010	0.014	0.25	0.36
G	0.100 BSC		2.54 BSC	
J	0.008	0.012	0.21	0.30
K	0.100	0.150	2.54	3.81
L	0.300 BSC		7.62 BSC	
M	0°	15°	0°	15°
N	0.015	0.100	0.38	2.54

STYLE 3:
 PIN 1. ANODE
 2. CATHODE
 3. NC
 4. EMITTER
 5. COLLECTOR
 6. NC

**CASE 730A-04
 ISSUE G**

SEATING PLANE

Notes:

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

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.320	0.350	8.13	8.89
B	0.240	0.260	6.10	6.60
C	0.115	0.200	2.93	5.08
D	0.016	0.020	0.41	0.50
E	0.040	0.070	1.02	1.77
F	0.010	0.014	0.25	0.36
G	0.100 BSC		2.54 BSC	
H	0.020	0.025	0.51	0.63
J	0.008	0.012	0.20	0.30
K	0.006	0.035	0.16	0.88
L	0.320 BSC		8.13 BSC	
S	0.332	0.390	8.43	9.90

**CASE 730C-04
 ISSUE D**

How to reach us:

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

MFAX: RMFA0@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

