



# 6-Pin DIP Optoisolators Transistor Output (No Base Connection)

The MOC8111, MOC8112 and MOC8113 devices consist of a gallium arsenide infrared emitting diode optically coupled to a monolithic silicon phototransistor detector. The internal base-to-Pin 6 connection has been eliminated for improved noise immunity.

- *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

- Appliances, Measuring Instruments
- Regulation and Feedback Control
- Programmable Controllers
- Interfacing and coupling systems of different potentials and impedances
- General Purpose Switching Circuits
- High Noise Environments

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

Rating	Symbol	Value	Unit
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#### INPUT LED

Reverse Voltage	V <sub>R</sub>	6	Volts
Forward Current — Continuous	I <sub>F</sub>	60	mA
LED Power Dissipation @ T <sub>A</sub> = 25°C with Negligible Power in Output Detector Derate above 25°C	P <sub>D</sub>	120	mW
		1.41	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 with Negligible Power in Input LED Derate above 25°C	P <sub>D</sub>	150	mW
		1.76	mW/°C

#### TOTAL DEVICE

Isolation Surge Voltage <sup>(1)</sup> (Peak ac Voltage, 60 Hz, 1 sec Duration)	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	mW
		2.94	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
Soldering Temperature (10 sec, 1/16" from case)	T <sub>L</sub>	260	°C

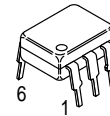
1. Isolation surge voltage is an internal device dielectric breakdown rating.  
For this test, Pins 1 and 2 are common, and Pins 4 and 5 are common.
2. Refer to Quality and Reliability Section in Opto Data Book for information on test conditions.

Preferred devices are Motorola recommended choices for future use and best overall value.  
GlobalOptoisolator is a trademark of Motorola, Inc.

**MOC8111\***  
[CTR = 20% Min]  
**MOC8112\***  
[CTR = 50% Min]  
**MOC8113**  
[CTR = 100% Min]

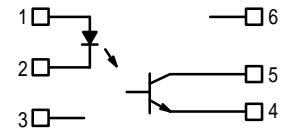
\*Motorola Preferred Devices

### STYLE 3 PLASTIC



STANDARD THRU HOLE  
CASE 730A-04

### SCHEMATIC



- PIN 1. LED ANODE
2. LED CATHODE
3. N.C.
4. EMITTER
5. COLLECTOR
6. N.C.

# MOC8111 MOC8112 MOC8113

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)<sup>(1)</sup>

Characteristic	Symbol	Min	Typ <sup>(1)</sup>	Max	Unit
<b>INPUT LED</b>					
Forward Voltage (I <sub>F</sub> = 10 mA)	V <sub>F</sub>	—	T <sub>A</sub> = 25°C 1.15	1.5	Volts
			T <sub>A</sub> = -55°C 1.3		
			T <sub>A</sub> = 100°C 1.05		
Reverse Leakage Current (V <sub>R</sub> = 6 V)	I <sub>R</sub>	—	0.05	10	μA
Capacitance (V = 0, f = 1 MHz)	C <sub>J</sub>	—	18	—	pF
<b>OUTPUT TRANSISTOR</b>					
Collector–Emitter Dark Current (V <sub>CE</sub> = 10 V, T <sub>A</sub> = 25°C)	I <sub>CEO</sub>	—	1	50	nA
			(V <sub>CE</sub> = 10 V, T <sub>A</sub> = 100°C)		
Collector–Emitter Breakdown Voltage (I <sub>C</sub> = 1 mA)	V <sub>(BR)CEO</sub>	30	45	—	Volts
Emitter–Collector Breakdown Voltage (I <sub>E</sub> = 100 μA)	V <sub>(BR)ECO</sub>	7	7.8	—	Volts
Collector–Emitter Capacitance (f = 1 MHz, V <sub>CE</sub> = 0)	C <sub>CCE</sub>	—	7	—	pF

### COUPLED

Output Collector Current (I <sub>F</sub> = 10 mA, V <sub>CE</sub> = 10 V)	MOC8111 MOC8112 MOC8113	I <sub>C</sub> (CTR) <sup>(2)</sup>	2 (20) 5 (50) 10 (100)	5 (50) 10 (100) 20 (200)	— — —	mA (%)
Collector–Emitter Saturation Voltage (I <sub>C</sub> = 500 μA, I <sub>F</sub> = 10 mA)		V <sub>CE(sat)</sub>	—	0.15	0.4	Volts
Turn–On Time (I <sub>C</sub> = 2 mA, V <sub>CC</sub> = 10 V, R <sub>L</sub> = 100 Ω) <sup>(3)</sup>		t <sub>on</sub>	—	7.5	20	μs
Turn–Off Time (I <sub>C</sub> = 2 mA, V <sub>CC</sub> = 10 V, R <sub>L</sub> = 100 Ω) <sup>(3)</sup>		t <sub>off</sub>	—	5.7	20	μs
Rise Time (I <sub>C</sub> = 2 mA, V <sub>CC</sub> = 10 V, R <sub>L</sub> = 100 Ω) <sup>(3)</sup>		t <sub>r</sub>	—	3.2	—	μs
Fall Time (I <sub>C</sub> = 2 mA, V <sub>CC</sub> = 10 V, R <sub>L</sub> = 100 Ω) <sup>(3)</sup>		t <sub>f</sub>	—	4.7	—	μs
Isolation Voltage (f = 60 Hz, t = 1 sec) <sup>(4)</sup>		V <sub>ISO</sub>	7500	—	—	Vac(pk)
Isolation Resistance (V = 500 V) <sup>(4)</sup>		R <sub>ISO</sub>	10 <sup>11</sup>	—	—	Ω
Isolation Capacitance (V = 0, f = 1 MHz) <sup>(4)</sup>		C <sub>ISO</sub>	—	0.2	—	pF

1. Always design to the specified minimum/maximum electrical limits (where applicable).
2. Current Transfer Ratio (CTR) = I<sub>C</sub>/I<sub>F</sub> x 100%.
3. For test circuit setup and waveforms, refer to Figure 10.
4. For this test, Pins 1 and 2 are common, and Pins 4 and 5 are common.

### TYPICAL CHARACTERISTICS

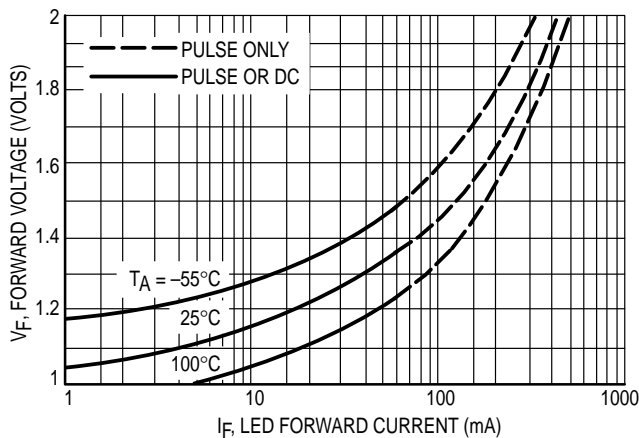


Figure 1. LED Forward Voltage versus Forward Current

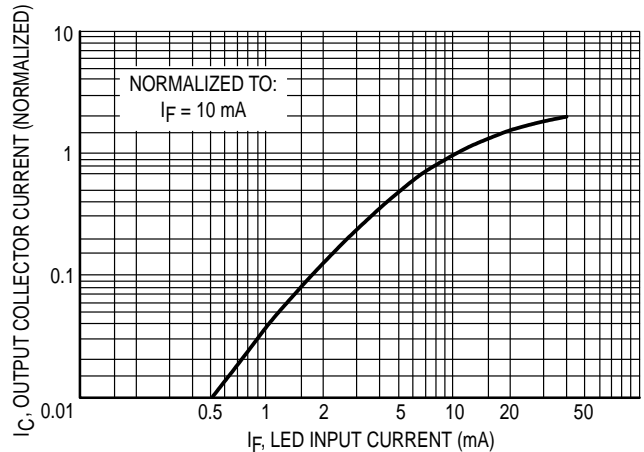


Figure 2. Output Current versus Input Current

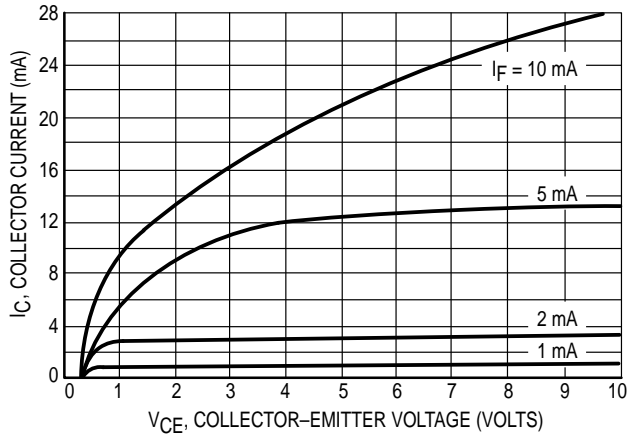


Figure 3. Collector Current versus Collector-Emitter Voltage

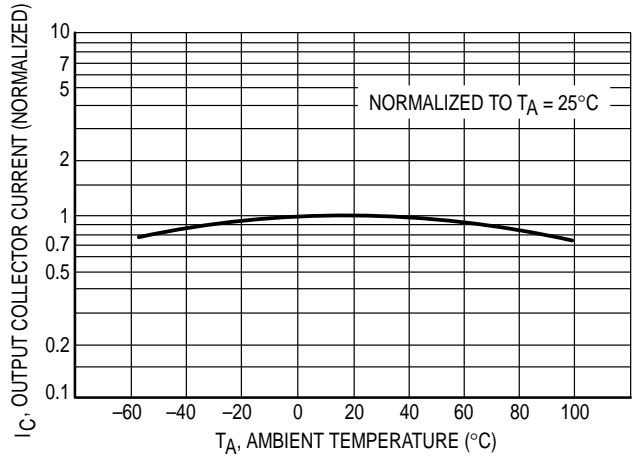


Figure 4. Output Current versus Ambient Temperature

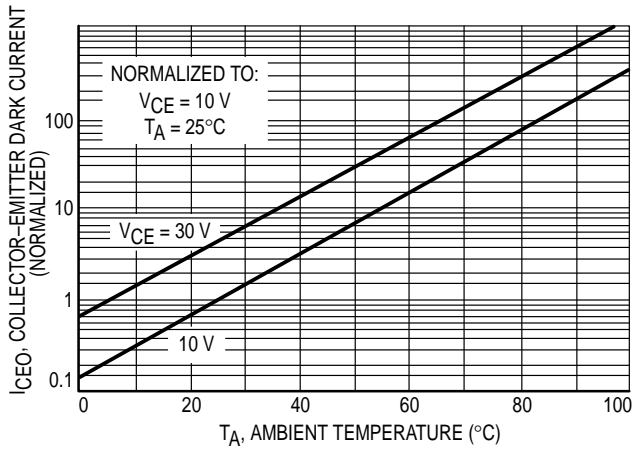


Figure 5. Dark Current versus Ambient Temperature

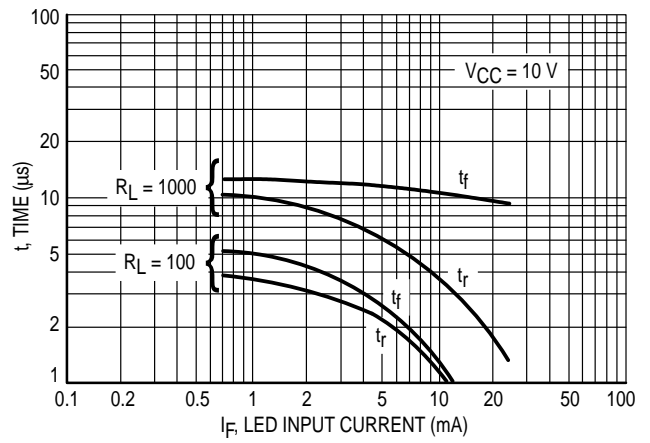


Figure 6. Rise and Fall Times (Typical Values)

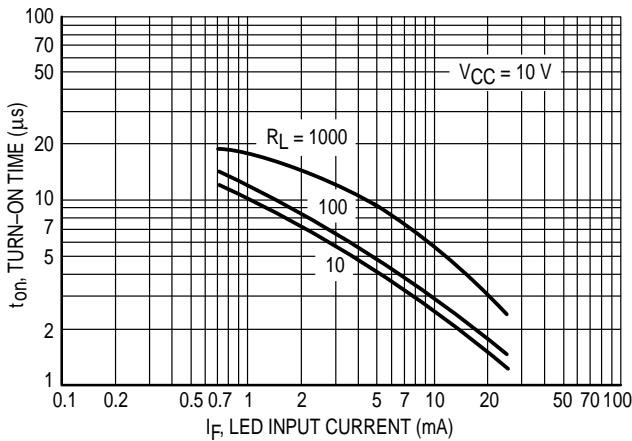


Figure 7. Turn-On Switching Times

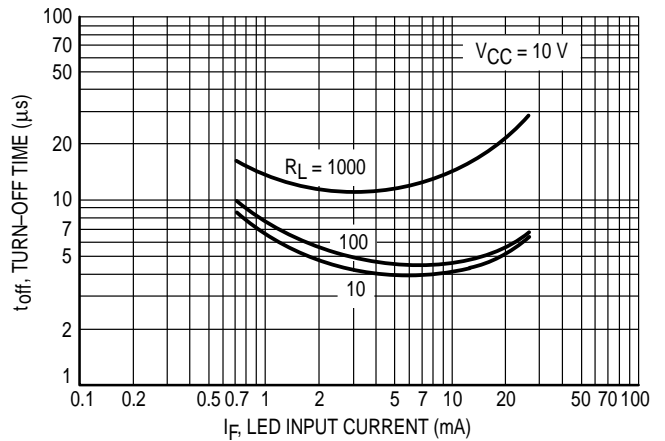
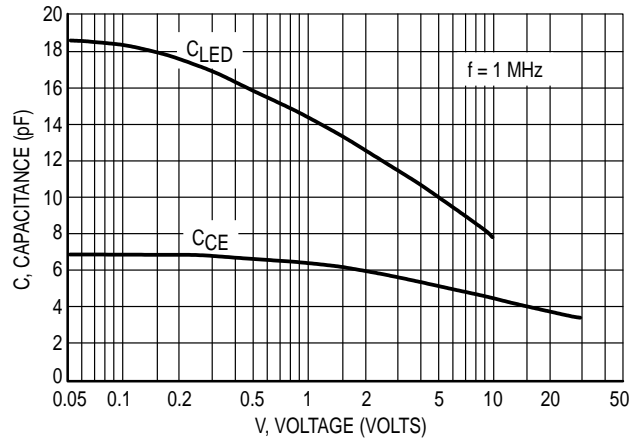
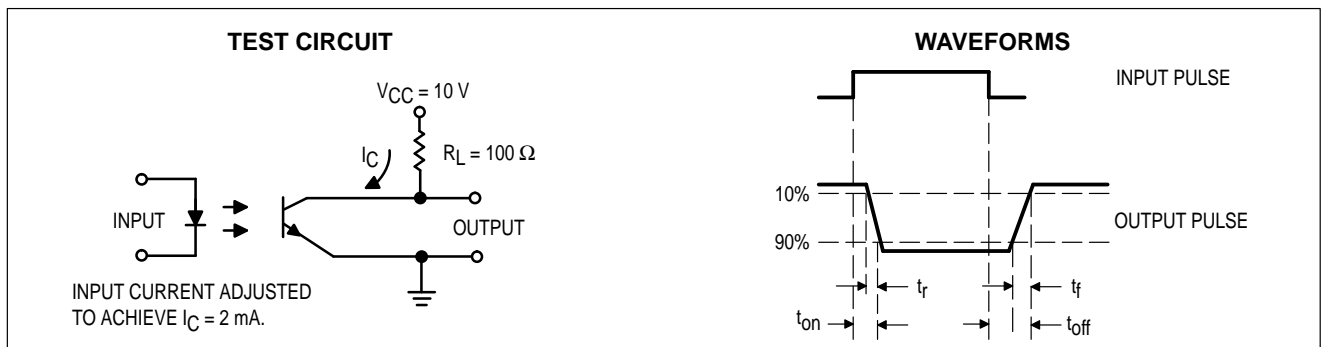


Figure 8. Turn-Off Switching Times

**MOC8111 MOC8112 MOC8113**

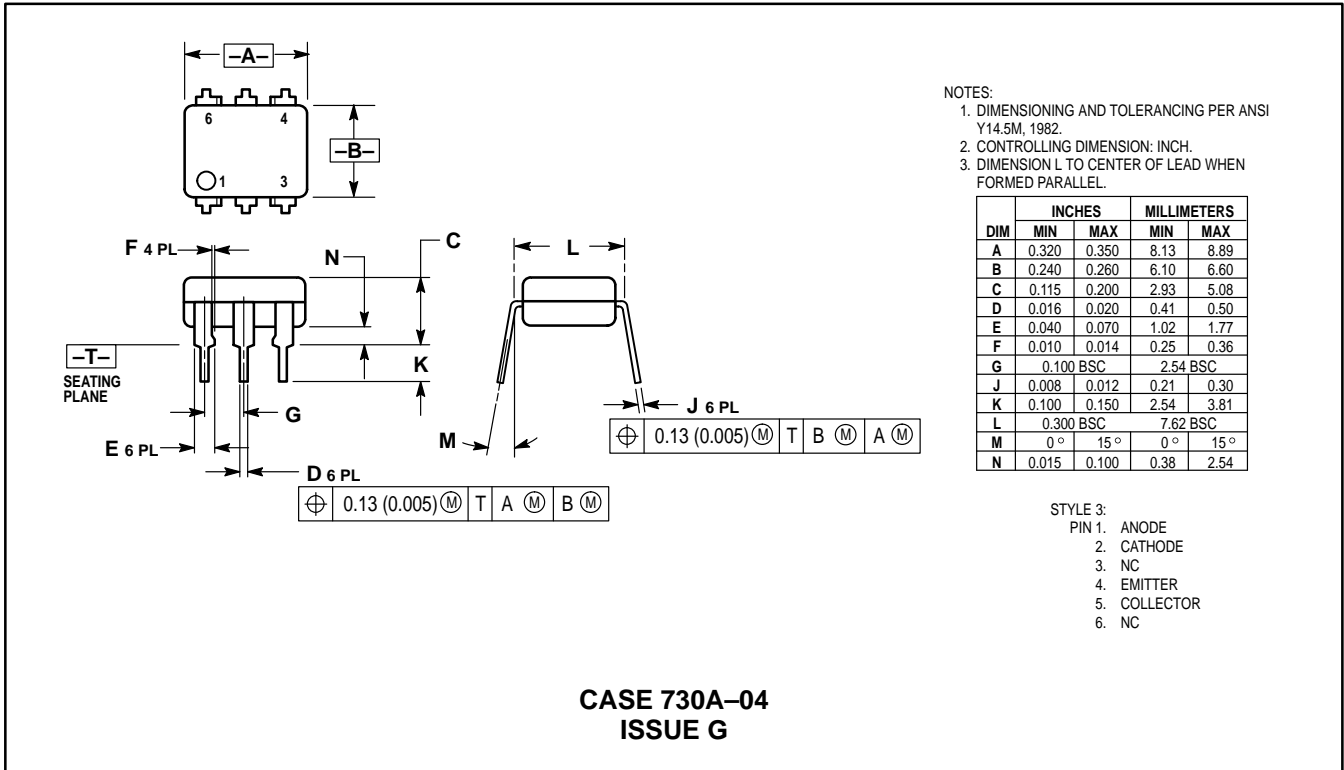


**Figure 9. Capacitances versus Voltage**



**Figure 10. Switching Time Test Circuit and Waveforms**

PACKAGE DIMENSIONS



# MOC8111 MOC8112 MOC8113



- 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	0.400	0.425	10.16	10.80
N	0.015	0.040	0.38	1.02

**\*Consult factory for leadform option availability**

**CASE 730D-05  
ISSUE D**

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