



6-Pin DIP Optoisolators Darlington Output (No Base Connection)

The MOC8020 and MOC8021 devices consist of a gallium arsenide infrared emitting diode optically coupled to a monolithic silicon photodarlington detector. The chip to Pin 6 base connection has been eliminated to improve the device's output performance in higher noise environments.

- No Base Connection for Improved Noise Immunity
- Higher Sensitivity to Low Input Drive Current
- **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
- I/O Interfaces for Computers
- Programmable Controllers
- Portable Electronics
- Interfacing and coupling systems of different potentials and impedances
- Solid State Relays
- Circuits Exposed to High Noise Environments

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

Rating	Symbol	Value	Unit
--------	--------	-------	------

INPUT LED

Reverse Voltage	V_R	3	Volts
Forward Current — Continuous	I_F	60	mA
LED Power Dissipation @ $T_A = 25^\circ\text{C}$ with Negligible Power in Output Detector Derate above 25°C	P_D	120 1.41	mW mW/ $^\circ\text{C}$

OUTPUT DETECTOR

Collector–Emitter Voltage	V_{CEO}	50	Volts
Collector Current Continuous	I_C	150	mA
Emitter–Collector Voltage	V_{ECO}	5	Volts
Detector Power Dissipation @ $T_A = 25^\circ\text{C}$ with Negligible Power in Input LED Derate above 25°C	P_D	150 1.76	mW mW/ $^\circ\text{C}$

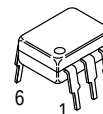
TOTAL DEVICE

Isolation Surge Voltage ⁽¹⁾ (Peak ac Voltage, 60 Hz, 1 sec Duration)	V_{ISO}	7500	Vac(pk)
Total Device Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	250 2.94	mW mW/ $^\circ\text{C}$
Ambient Operating Temperature Range ⁽²⁾	T_A	–55 to +100	$^\circ\text{C}$
Storage Temperature Range ⁽²⁾	T_{stg}	–55 to +150	$^\circ\text{C}$
Soldering Temperature (10 sec, 1/16" from case)	T_L	260	$^\circ\text{C}$

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.
- GlobalOptoisolator is a trademark of Motorola, Inc.

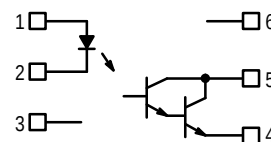
MOC8020
[CTR = 500% Min]
MOC8021
[CTR = 1000% Min]

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.

MOC8020 MOC8021

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

Characteristic	Symbol	Min	Typ ⁽¹⁾	Max	Unit
INPUT LED					
Reverse Leakage Current ($V_R = 3\text{ V}$)	I_R	—	0.05	10	μA
Forward Voltage ($I_F = 10\text{ mA}$)	V_F	—	1.15	2	Volts
Capacitance ($V = 0\text{ V}$, $f = 1\text{ MHz}$)	C	—	18	—	pF

PHOTODARLINGTON ($T_A = 25^\circ\text{C}$ and $I_F = 0$, unless otherwise noted)

Collector–Emitter Dark Current ($V_{CE} = 10\text{ V}$)	I_{CEO}	—	—	100	nA
Collector–Emitter Base Breakdown Voltage ($I_C = 1\text{ mA}$)	$V_{(BR)CEO}$	50	—	—	Volts
Emitter–Collector Breakdown Voltage ($I_E = 100\text{ }\mu\text{A}$)	$V_{(BR)ECO}$	5	—	—	Volts

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

Collector Output Current ($V_{CE} = 5\text{ V}$, $I_F = 10\text{ mA}$)	I_C (CTR) ⁽²⁾	50 (500) 100 (1000)	— —	— —	mA (%)
Isolation Surge Voltage ^(3,4) , 60 Hz Peak ac, 1 Second	V_{ISO}	7500	—	—	Vac(pk)
Isolation Resistance ⁽³⁾ ($V = 500\text{ V}$)	R_{ISO}	—	10^{11}	—	Ohms
Isolation Capacitance ⁽³⁾ ($V = 0$, $f = 1\text{ MHz}$)	C_{ISO}	—	0.2	—	pF

SWITCHING

Turn-On Time	$V_{CC} = 10\text{ V}$, $R_L = 100\text{ }\Omega$, $I_F = 5\text{ mA}$ ⁽⁵⁾	t_{on}	—	3.5	—	μs
Turn-Off Time		t_{off}	—	95	—	
Rise Time		t_r	—	1	—	
Fall Time		t_f	—	2	—	

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 this test, LED Pins 1 and 2 are common and Phototransistor Pins 4 and 5 are common.
4. Isolation Surge Voltage, V_{ISO} , is an internal device dielectric breakdown rating.
5. For test circuit setup and waveforms, refer to Figure 9.

TYPICAL CHARACTERISTICS

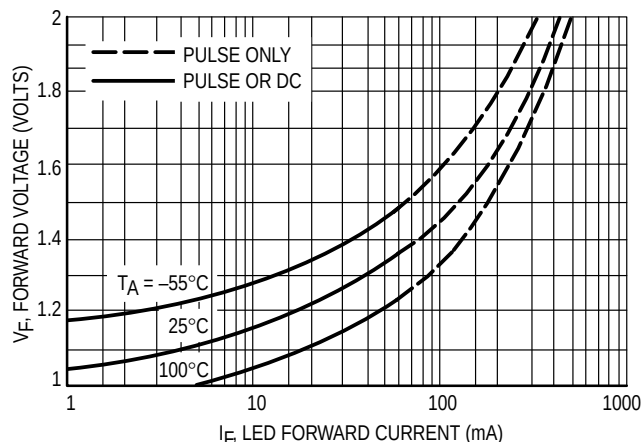


Figure 1. LED Forward Voltage versus Forward Current

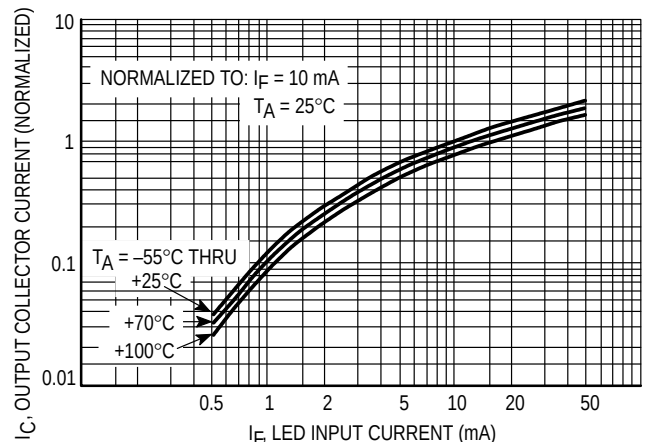


Figure 2. Output Current versus Input Current

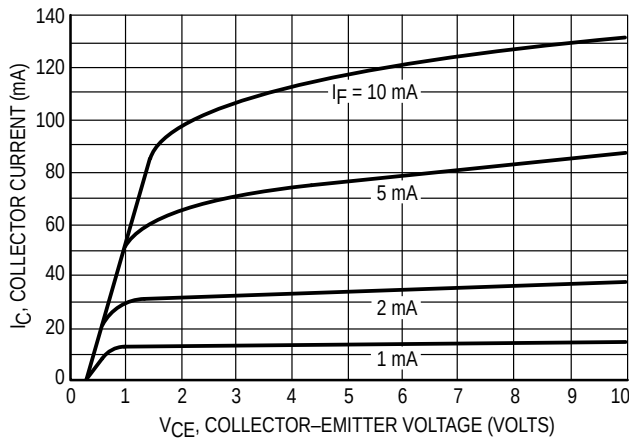


Figure 3. Collector Current versus Collector-Emitter Voltage

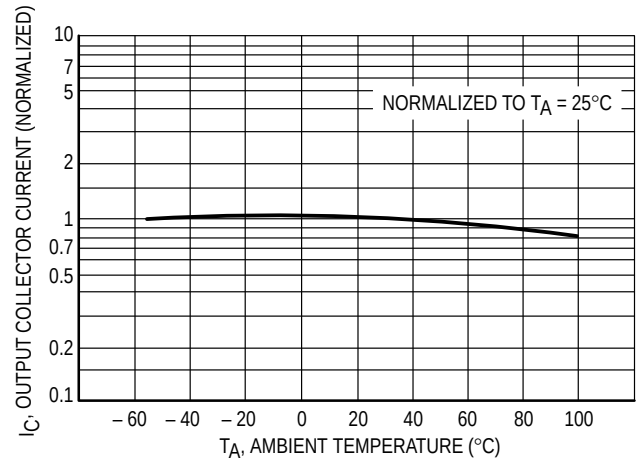


Figure 4. Output Current versus Ambient Temperature

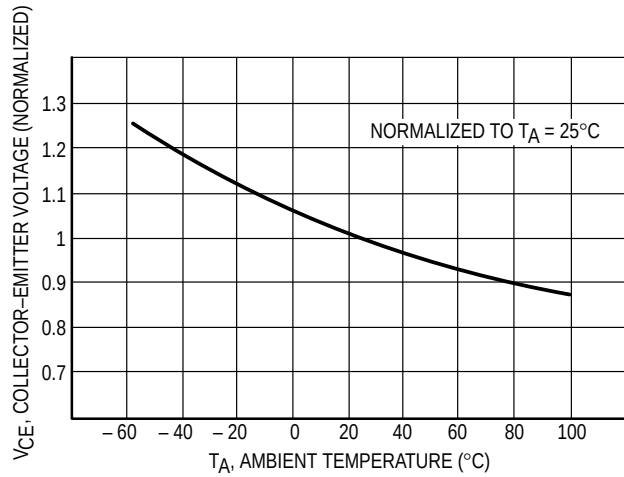


Figure 5. Collector-Emitter Voltage versus Ambient Temperature

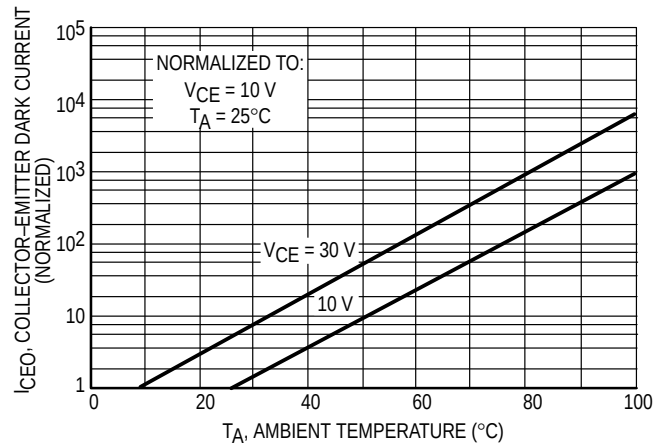


Figure 6. Collector-Emitter Dark Current versus Ambient Temperature

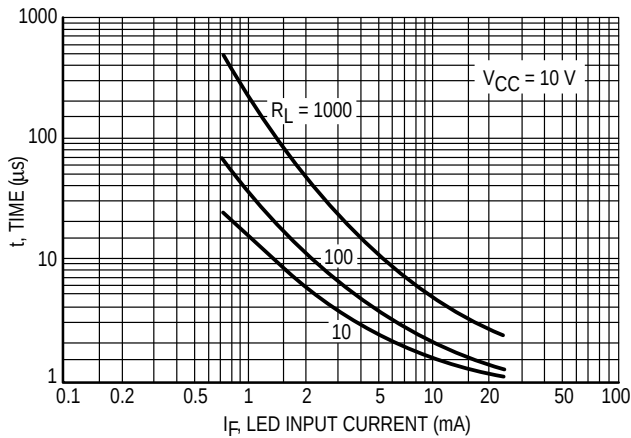


Figure 7. Turn-On Switching Times (Typical Value)

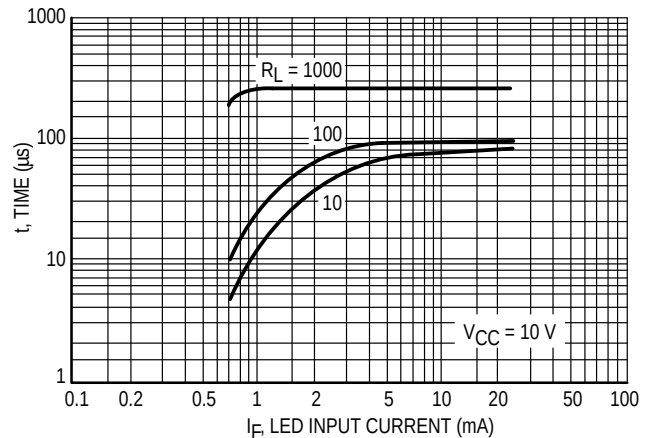


Figure 8. Turn-Off Switching Times (Typical Value)

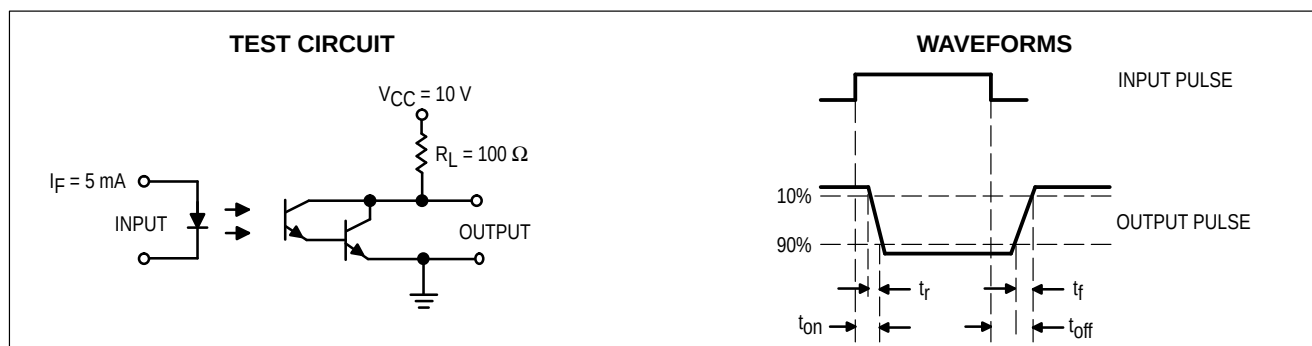
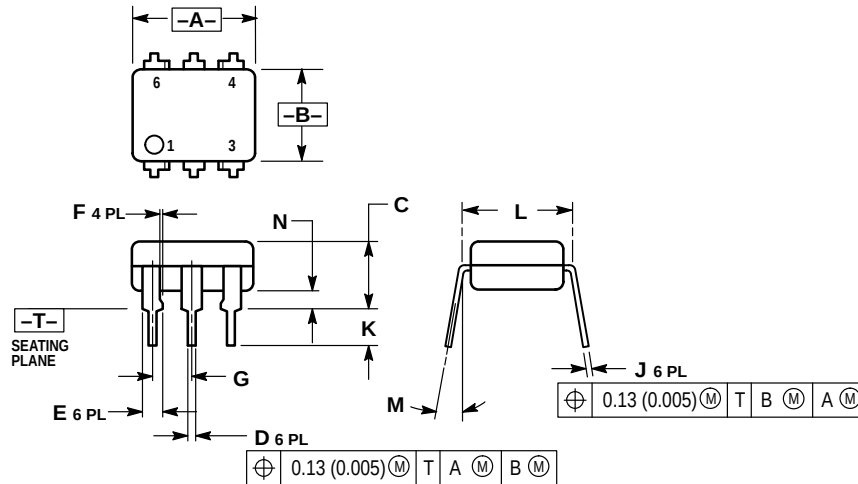


Figure 9. Switching Time Test Circuit and Waveforms

PACKAGE DIMENSIONS



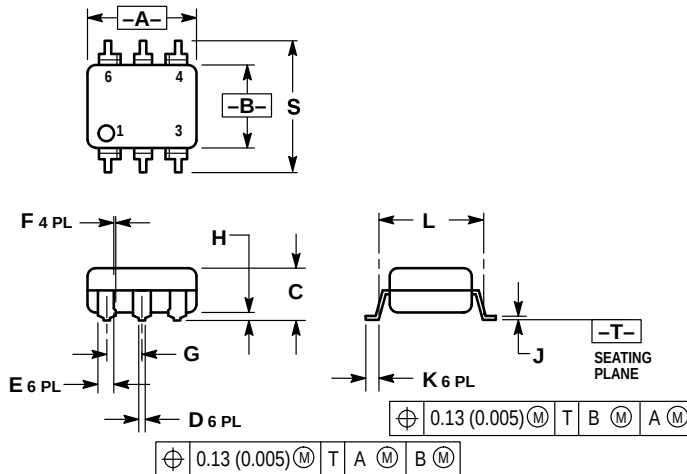
NOTES:

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

NOTES:

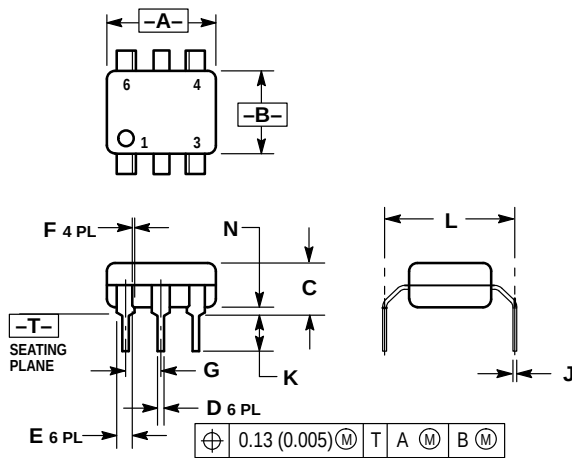
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

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

***Consult factory for leadform option availability**

CASE 730C-04
ISSUE D

MOC8020 MOC8021



- 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

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.

How to reach us:

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

MFAX: RMFAX0@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



MOC8020/D

