GlobalOptoisolator™

VDE | UL | CSA | SETI | SEMKO | DEMKO | NEMKO | BABT

6-Pin DIP Optoisolators Darlington Output

4N29
4N29A
4N30*
[CTR = 100% Min]
4N31
[CTR = 50% Min]
4N32*
4N33 *
[CTR = 500% Min]
*Motorola Preferred Devices

The 4N29/A, 4N30, 4N31, 4N32(1) and 4N33(1) devices consist of a gallium arsenide infrared emitting diode optically coupled to a monolithic silicon photodarlington detector.

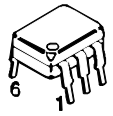
This series is designed for use in applications requiring high collector output currents at lower input currents.

- Higher Sensitivity to Low Input Drive Current
- Meets or Exceeds All JEDEC Registered Specifications
- ***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

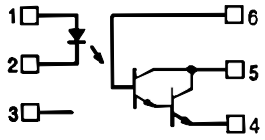
- Low Power Logic Circuits
- Interfacing and coupling systems of different potentials and impedances
- Telecommunications Equipment
- Portable Electronics
- Solid State Relays

STYLE 1 PLASTIC



STANDARD THRU HOLE
CASE 730A–04

SCHEMATIC



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

MAXIMUM RATINGS (T_A = 25°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°C Derate above 25°C	P_D	120 1.41	mW mW/°C
OUTPUT DETECTOR			
Collector–Emitter Voltage	V_{CEO}	30	Volts
Emitter–Collector Voltage	V_{ECO}	5	Volts
Collector–Base Voltage	V_{CBO}	30	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			
Isolation Surge Voltage(2) (Peak ac Voltage, 60 Hz, 1 sec Duration)	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(3)	T_A	−55 to +100	°C
Storage Temperature Range(3)	T_{stg}	−55 to +150	°C
Soldering Temperature (10 sec, 1/16" from case)	T_L	260	°C

1. Difference in 4N32 and 4N33 is JEDEC Registration for VISO only. All Motorola 6–Pin devices exceed JEDEC specification and are 7500 Vac(pk). The same applies for 4N29 and 4N30.
2. Isolation surge voltage is an internal device dielectric breakdown rating. For this test, Pins 1 and 2 are common, and Pins 4, 5 and 6 are common.
3. 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.

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

Characteristic		Symbol	Min	Typ(1)	Max	Unit
INPUT LED						
*Reverse Leakage Current (V_R = 3 V, R_L = 1 M ohms)		I_R	—	0.05	100	µA
*Forward Voltage (I_F = 10 mA)		V_F	—	1.34	1.5	Volts
Capacitance (V_R = 0 V, f = 1 MHz)		C	—	1.8	—	pF
OUTPUT DETECTOR (T_A = 25°C and I_F = 0, unless otherwise noted)						
*Collector–Emitter Dark Current (V_{CE} = 10 V, Base Open)		I_{CEO}	—	—	100	nA
*Collector–Base Breakdown Voltage (I_C = 100 µA, I_E = 0)		$V_{(BR)CBO}$	30	—	—	Volts
*Collector–Emitter Breakdown Voltage (I_C = 100 µA, I_B = 0)		$V_{(BR)CEO}$	30	—	—	Volts
*Emitter–Collector Breakdown Voltage (I_E = 100 µA, I_B = 0)		$V_{(BR)ECO}$	5	—	—	Volts
DC Current Gain (V_{CE} = 5 V, I_C = 500 µA)		h_{FE}	—	16K	—	—
COUPLED (T_A = 25°C unless otherwise noted)						
*Collector Output Current(3) (V_{CE} = 10 V, I_F = 10 mA)	4N32, 4N33 4N29, 4N30 4N31	I_C (CTR)(2)	50 (500) 10 (100) 5 (50)	— — —	— — —	mA (%)
Isolation Surge Voltage(4,5) (60 Hz ac Peak, 1 Second)	4N29/A, 4N30, 31, 32, 33 *4N29, 4N32 *4N30, 4N31, 4N33	V_{ISO}	7500 2500 1500	— — —	— — —	Vac(pk)
Isolation Resistance(4) (V = 500 V)		R_{ISO}	—	10^{11}	—	Ohms
*Collector–Emitter Saturation Voltage(3) (I_C = 2 mA, I_F = 8 mA)	4N31 4N29, 4N30, 4N32, 4N33	$V_{CE(sat)}$	— —	— —	1.2 1	Volts
Isolation Capacitance(4) (V = 0 V, f = 1 MHz)		C_{ISO}	—	0.2	—	pF
Turn–On Time(6) (I_C = 50 mA, I_F = 200 mA, V_{CC} = 10 V)		t_{on}	—	0.6	5	µs
Turn–Off Time(6) (I_C = 50 mA, I_F = 200 mA, V_{CC} = 10 V)	4N29, 30, 31 4N32, 33	t_{off}	— —	17 45	40 100	µs

* Indicates JEDEC Registered Data. All Motorola 6–pin devices have V_{ISO} rating of 7500 Vac(pk).

1. Always design to the specified minimum/maximum electrical limits (where applicable).
2. Current Transfer Ratio (CTR) = I_C/I_F x 100%.
3. Pulse Test: Pulse Width = 300 µs, Duty Cycle ≤ 2%.
4. For this test, Pins 1 and 2 are common and Pins 4, 5 and 6 are common.
5. Isolation Surge Voltage, V_{ISO}, is an internal device dielectric breakdown rating.
6. For test circuit setup and waveforms, refer to Figure 11.

TYPICAL CHARACTERISTICS

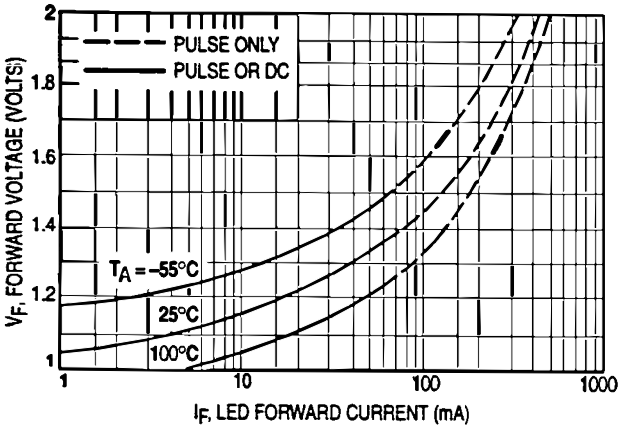


Figure 1. LED Forward Voltage versus Forward Current

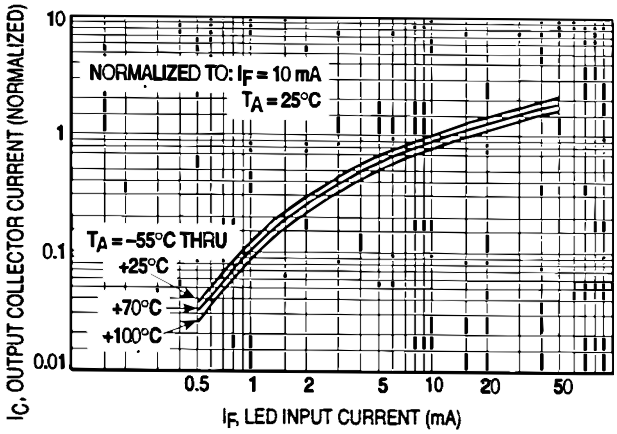


Figure 2. Output Current versus Input Current

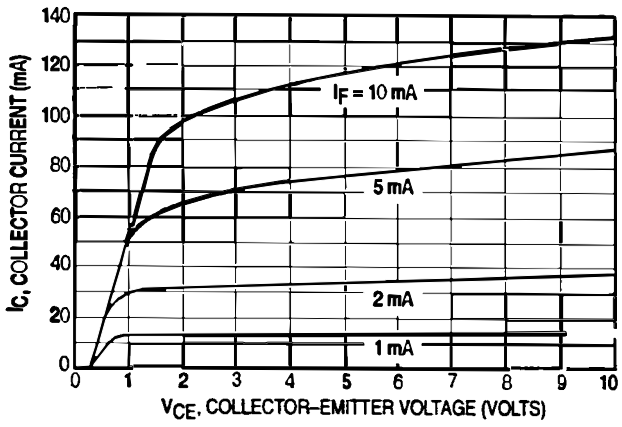


Figure 3. Collector Current versus Collector–Emitter Voltage

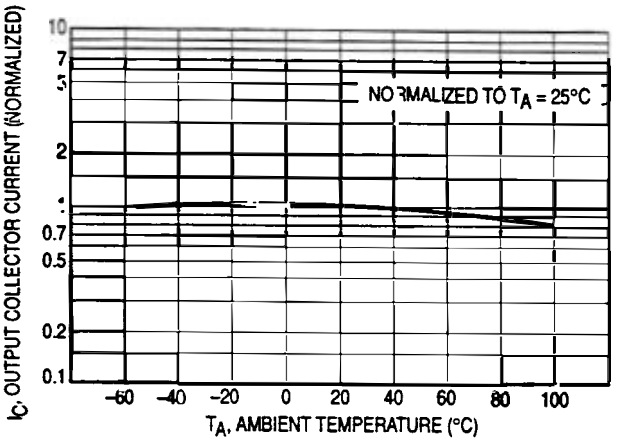


Figure 4. Output Current versus Ambient Temperature

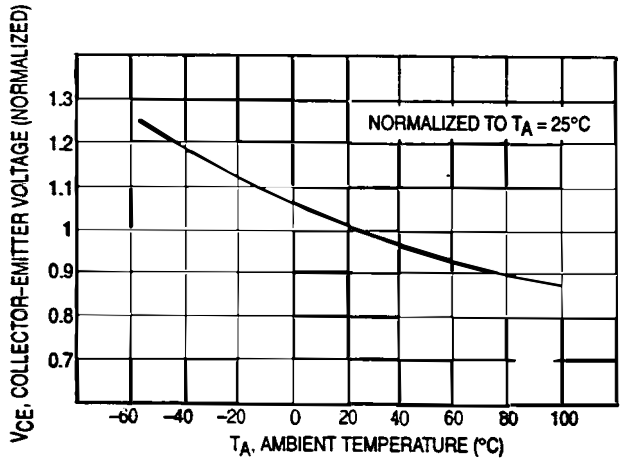


Figure 5. Collector–Emitter Voltage versus Ambient Temperature

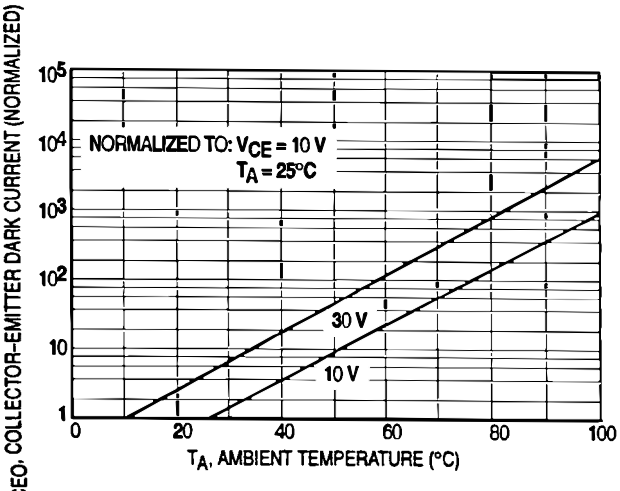


Figure 6. Collector–Emitter Dark Current versus Ambient Temperature

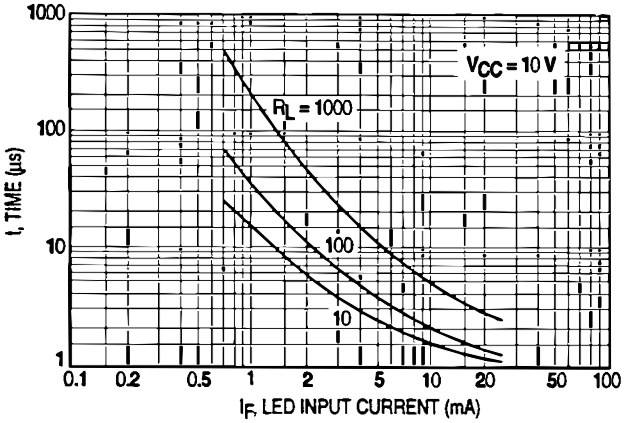


Figure 7. Turn–On Switching Times

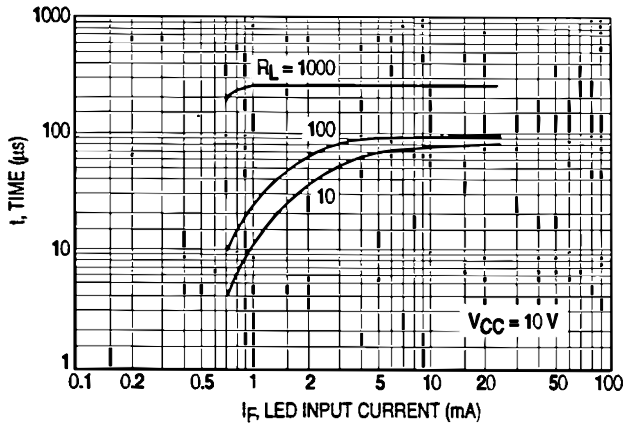


Figure 8. Turn–Off Switching Times

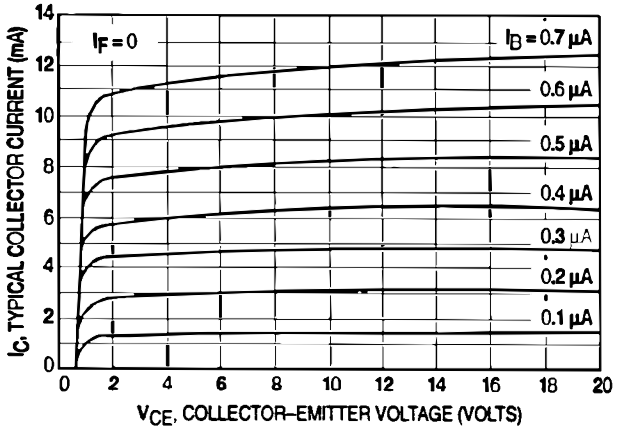


Figure 9. DC Current Gain (Detector Only)

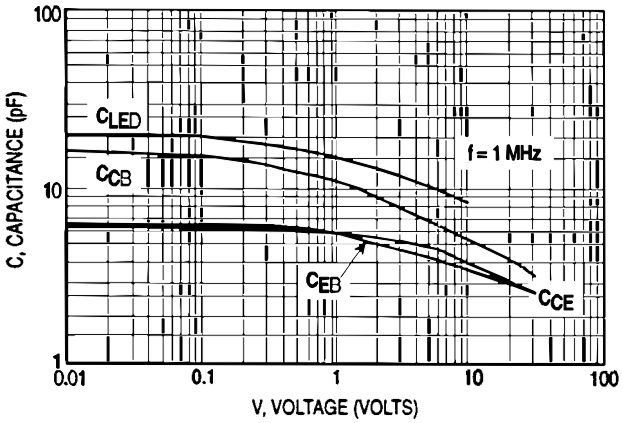


Figure 10. Capacitances versus Voltage

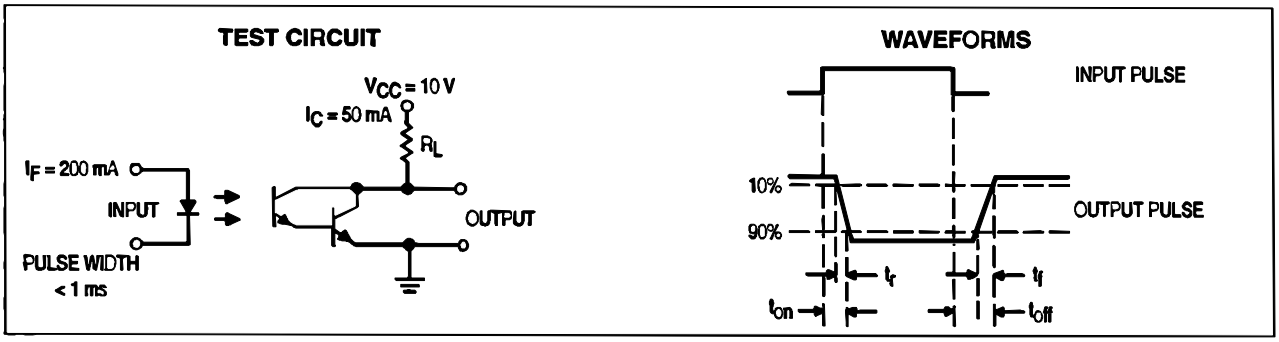
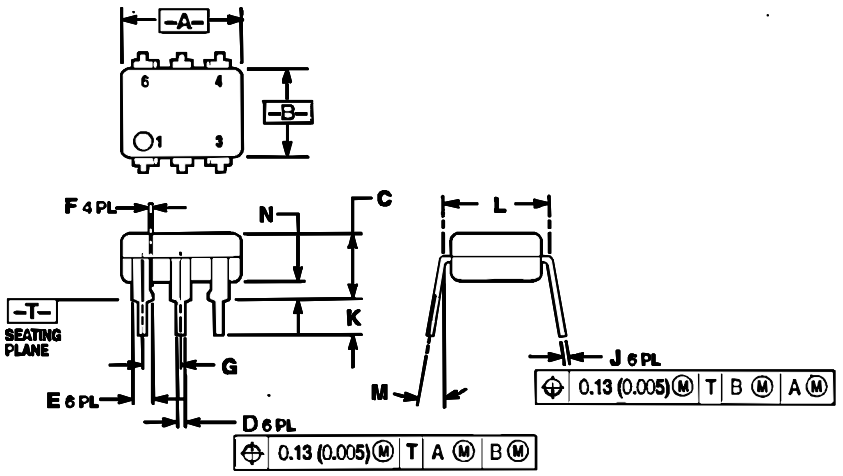


Figure 11. Switching Time Test Circuit and Waveforms

PACKAGE DIMENSIONS

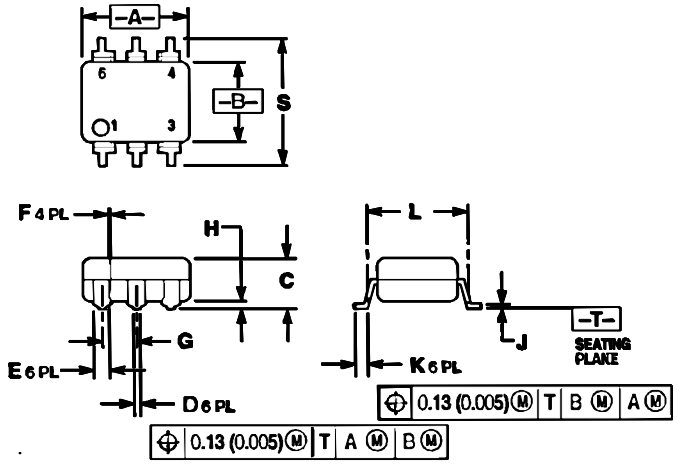


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.

	INCHES		MILLIMETERS	
DIM	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 1:
PIN 1. ANODE
2. CATHODE
3. NC
4. EMITTER
5. COLLECTOR
6. BASE

CASE 730A–04
ISSUE G



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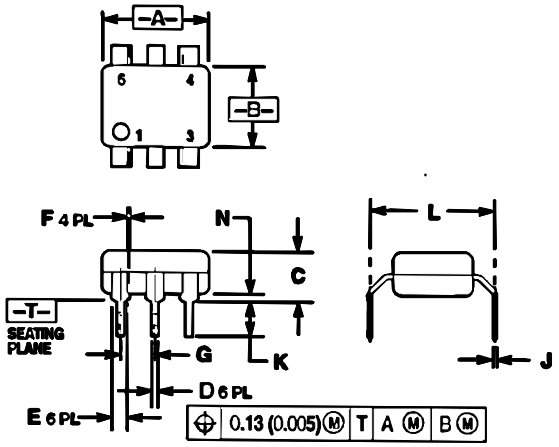
C	0.115	0.200	2.93	5.08
D	0.016	0.020	0.41	0.50
E	0.040	0.070	1.02	1.77
F	0.010	0.014	0.25	0.36
G	0.100 BSC		2.54 BSC	
H	0.020	0.025	0.51	0.63
J	0.008	0.012	0.20	0.30
K	0.005	0.035	0.16	0.88
L	0.320 BSC		8.13 BSC	
S	0.332	0.390	8.43	9.90

***Consult factory for leadform option availability**

CASE 730C–04
ISSUE D



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3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
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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	0.33	1.02

***Consult factory for leadform option availability**

CASE 730D–05
ISSUE D

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