



# 6-Pin DIP Optoisolators Darlington Output (Low Input Current)

**H11B1\***  
[CTR = 500% Min]  
**H11B3**  
[CTR = 100% Min]  
\*Motorola Preferred Device

The H11B1 and H11B3 devices consist of a gallium arsenide infrared emitting diode optically coupled to a monolithic silicon photodarlington detector. They are designed for use in applications requiring high output current ( $I_C$ ) at low LED input currents ( $I_F$ ).

- High Sensitivity to Low Input Drive Current ( $I_F = 1 \text{ mA}$ )
- **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
- Interfacing and coupling systems of different potentials and impedances
- Solid State Relays
- Portable Electronics

**STYLE 1 PLASTIC**

**STANDARD THRU HOLE  
CASE 730A-04**

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

Rating	Symbol	Value	Unit
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#### 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 $25^\circ\text{C}$	$P_D$	150	mW
		1.41	mW/ $^\circ\text{C}$

#### OUTPUT DETECTOR

Collector–Emitter Voltage	$V_{CEO}$	25	Volts
Emitter–Base Voltage	$V_{EBO}$	7	Volts
Collector–Base Voltage	$V_{CBO}$	30	Volts
Collector Current — Continuous	$I_C$	100	mA
Detector Power Dissipation @ $T_A = 25^\circ\text{C}$ with Negligible Power in Input LED Derate above $25^\circ\text{C}$	$P_D$	150	mW
		1.76	mW/ $^\circ\text{C}$

#### TOTAL DEVICE

Isolation Surge Voltage <sup>(1)</sup> (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 $25^\circ\text{C}$	$P_D$	250 2.94	mW mW/ $^\circ\text{C}$
Ambient Operating Temperature Range <sup>(2)</sup>	$T_A$	-55 to +100	$^\circ\text{C}$
Storage Temperature Range <sup>(2)</sup>	$T_{stg}$	-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, 5 and 6 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.

**SCHEMATIC**

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

# H11B1 H11B3

## 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)	H11B1	V <sub>F</sub>	—	1.15	1.5	Volts
Forward Voltage (I <sub>F</sub> = 50 mA)	H11B3	V <sub>F</sub>	—	1.34	1.5	Volts
Reverse Leakage Current (V <sub>R</sub> = 3 V)	I <sub>R</sub>	—	—	10	μA	
Capacitance (V = 0 V, f = 1 MHz)	C <sub>J</sub>	—	18	—	pF	

## OUTPUT DETECTOR

Collector–Emitter Dark Current (V <sub>CE</sub> = 10 V)	I <sub>CEO</sub>	—	5	100	nA
Collector–Emitter Breakdown Voltage (I <sub>C</sub> = 10 mA)	V <sub>(BR)CEO</sub>	25	80	—	Volts
Collector–Base Breakdown Voltage (I <sub>C</sub> = 100 μA)	V <sub>(BR)CBO</sub>	30	100	—	Volts
Emitter–Collector Breakdown Voltage (I <sub>E</sub> = 100 μA)	V <sub>(BR)ECO</sub>	7	—	—	Volts
DC Current Gain (I <sub>C</sub> = 5 mA, V <sub>CE</sub> = 5 V) (Typical Value)	h <sub>FE</sub>	—	16K	—	—
Collector–Emitter Capacitance (f = 1 MHz, V <sub>CE</sub> = 5 V)	C <sub>CE</sub>	—	4.9	—	pF
Collector–Base Capacitance (f = 1 MHz, V <sub>CB</sub> = 5 V)	C <sub>CB</sub>	—	6.3	—	pF
Emitter–Base Capacitance (f = 1 MHz, V <sub>EB</sub> = 5 V)	C <sub>EB</sub>	—	3.8	—	pF

## COUPLED

Output Collector Current (I <sub>F</sub> = 1 mA, V <sub>CE</sub> = 5 V)	H11B1 H11B3	I <sub>C</sub> (CTR) <sup>(2)</sup>	5 (500) 1 (100)	—	—	mA (%)
Collector–Emitter Saturation Voltage (I <sub>C</sub> = 1 mA, I <sub>F</sub> = 1 mA)		V <sub>CE(sat)</sub>	—	0.7	1	Volts
Turn–On Time (I <sub>F</sub> = 5 mA, V <sub>CC</sub> = 10 V, R <sub>L</sub> = 100 Ω) <sup>(3)</sup>		t <sub>on</sub>	—	3.5	—	μs
Turn–Off Time (I <sub>F</sub> = 5 mA, V <sub>CC</sub> = 10 V, R <sub>L</sub> = 100 Ω) <sup>(3)</sup>		t <sub>off</sub>	—	95	—	μs
Rise Time (I <sub>F</sub> = 5 mA, V <sub>CC</sub> = 10 V, R <sub>L</sub> = 100 Ω) <sup>(3)</sup>		t <sub>r</sub>	—	1	—	μs
Fall Time (I <sub>F</sub> = 5 mA, V <sub>CC</sub> = 10 V, R <sub>L</sub> = 100 Ω) <sup>(3)</sup>		t <sub>f</sub>	—	2	—	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 V, 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> × 100%.
3. For test circuit setup and waveforms, refer to Figure 11.
4. For this test, Pins 1 and 2 are common, and Pins 4, 5 and 6 are common.

## TYPICAL CHARACTERISTICS

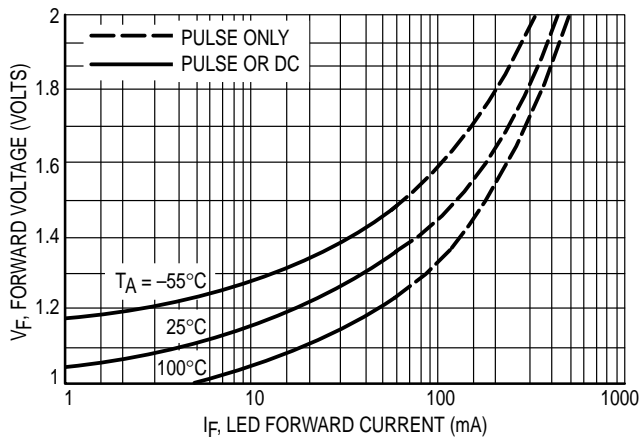


Figure 1. LED Forward Voltage versus Forward Current

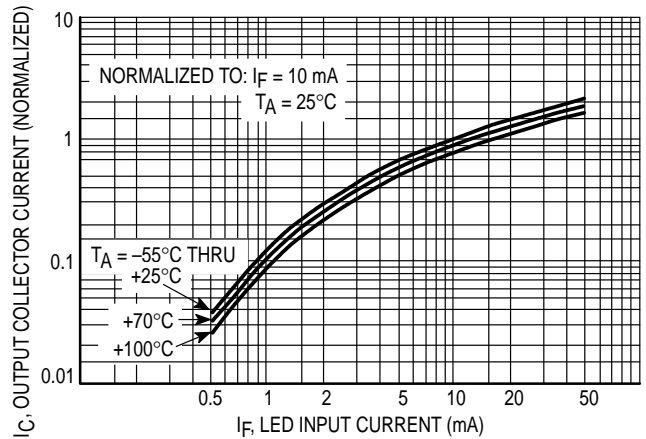
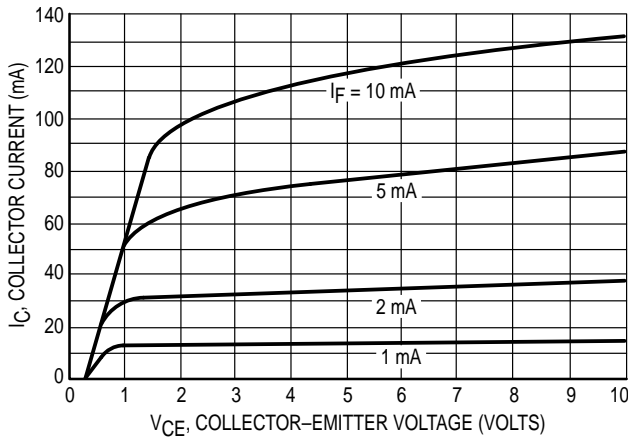
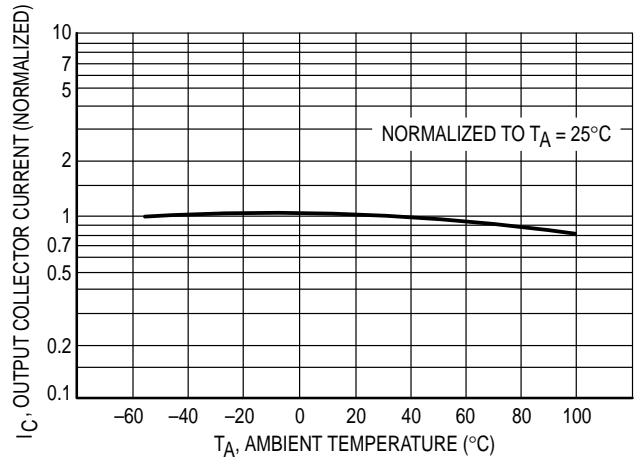


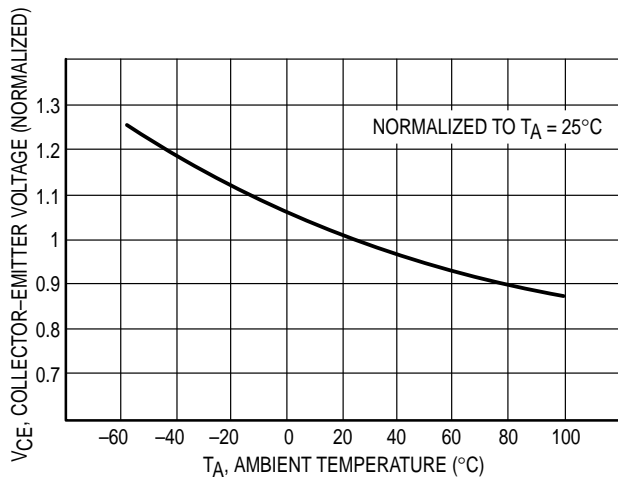
Figure 2. Output Current versus Input Current



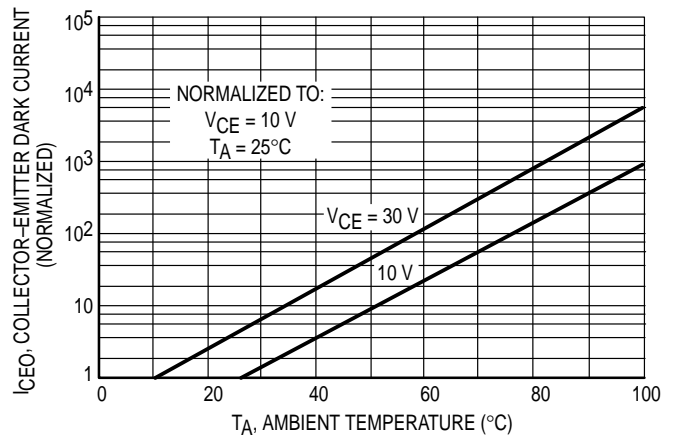
**Figure 3. Collector Current versus Collector-Emitter Voltage**



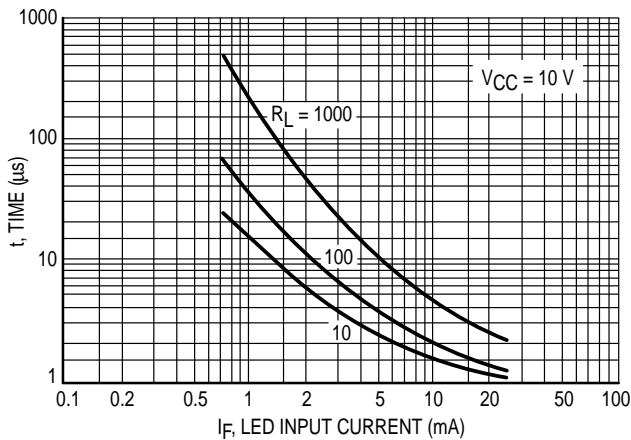
**Figure 4. Output Current versus Ambient Temperature**



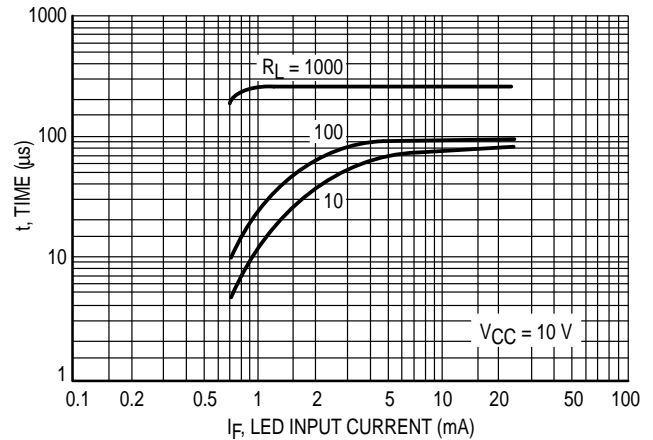
**Figure 5. Collector-Emitter Voltage versus Ambient Temperature**



**Figure 6. Collector-Emitter Dark Current versus Ambient Temperature**



**Figure 7. Turn-On Switching Times (Typical Values)**



**Figure 8. Turn-Off Switching Times (Typical Values)**

# H11B1 H11B3

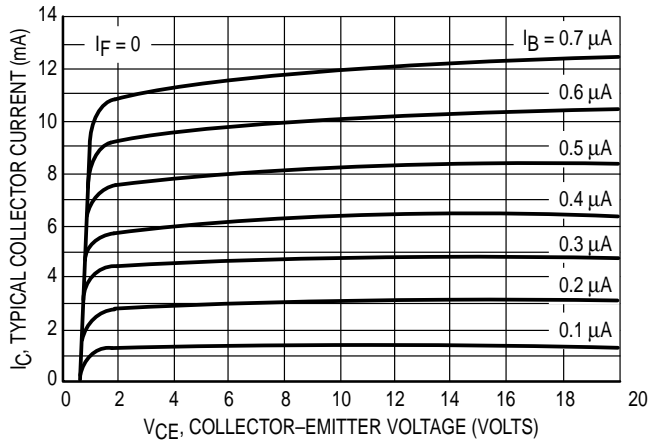


Figure 9. DC Current Gain (Detector Only)

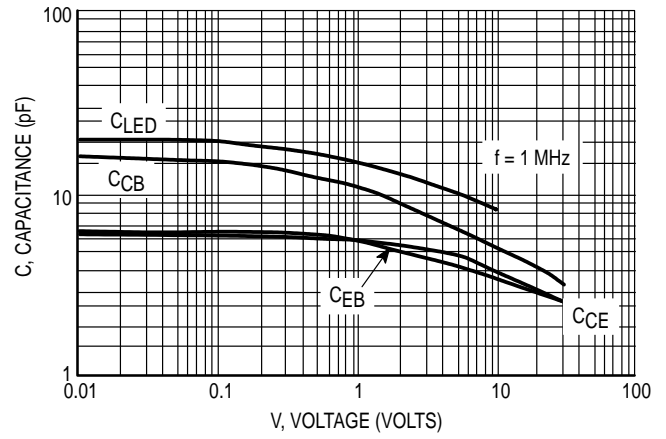


Figure 10. Capacitance versus Voltage

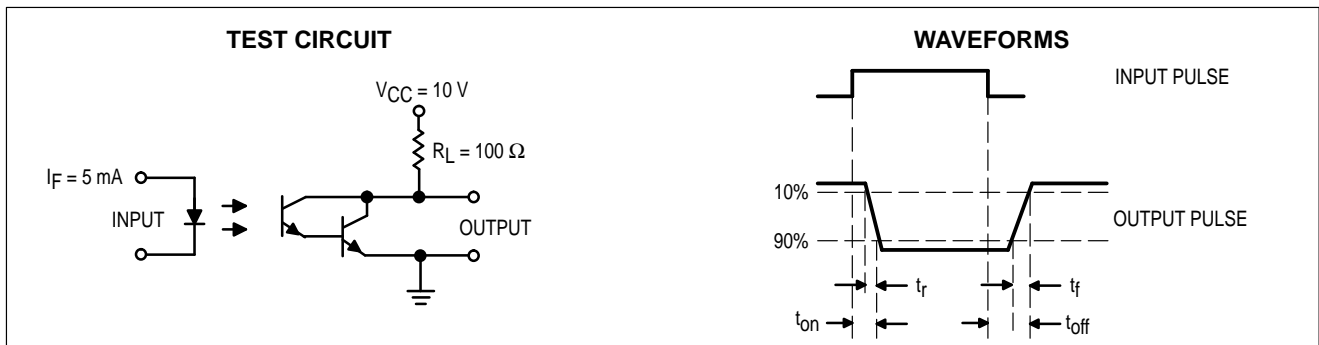
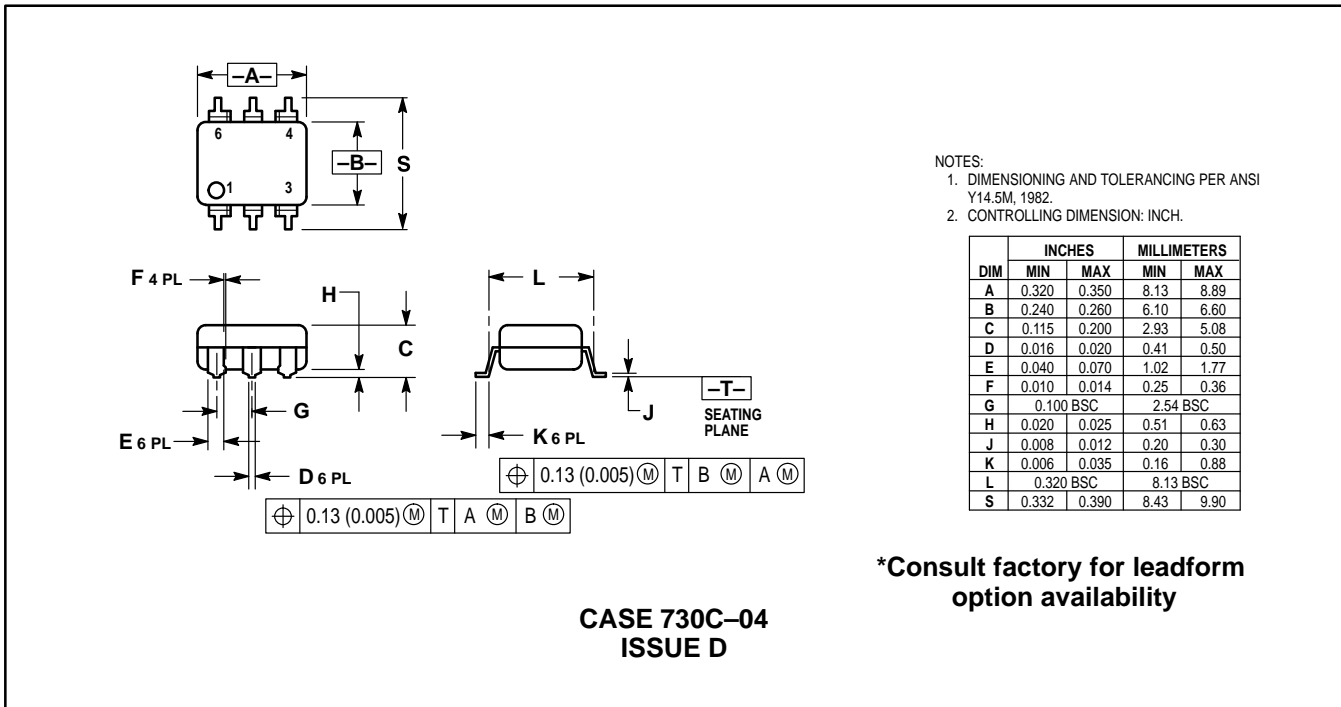
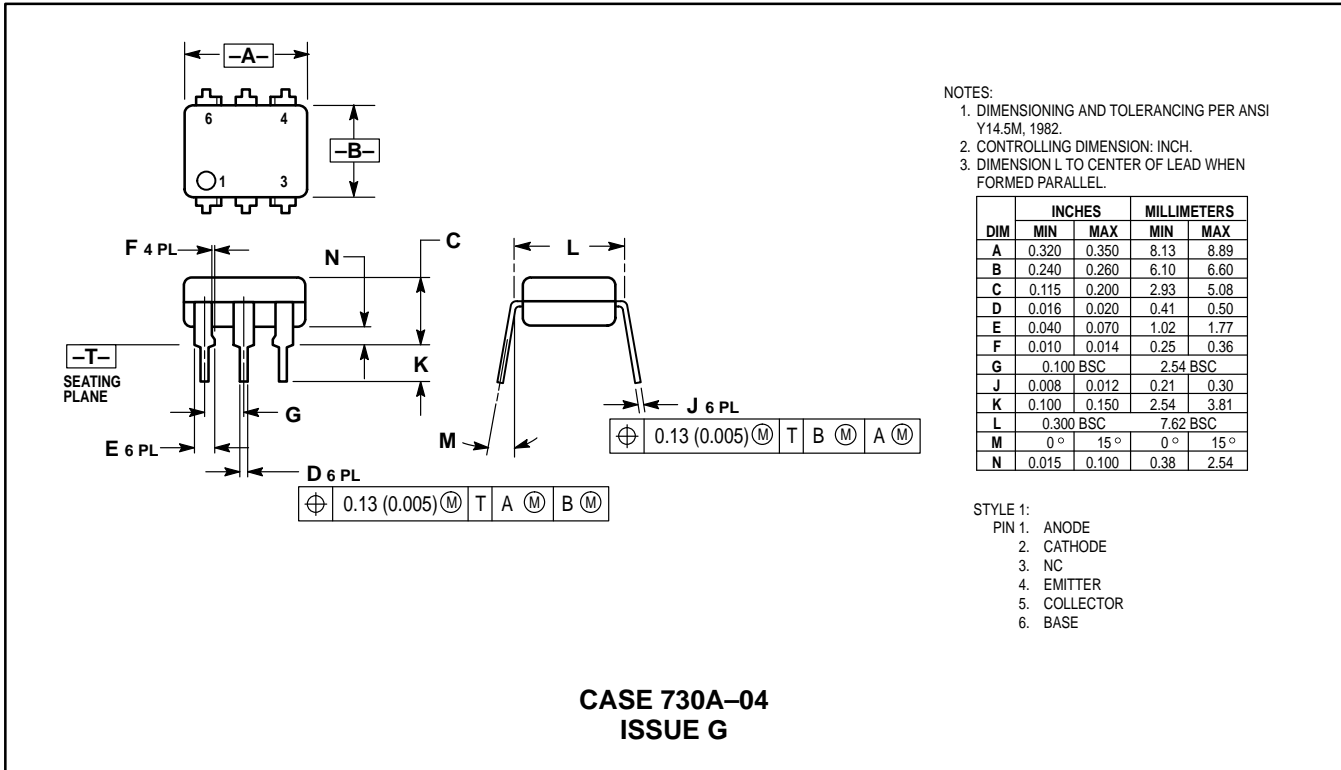


Figure 11. Switching Time Test Circuit and Waveforms

PACKAGE DIMENSIONS



# H11B1 H11B3



- 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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### How to reach us:

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

**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

**MFAX:** RMFAX0@email.sps.mot.com - TOUCHTONE (602) 244-6609  
**INTERNET:** http://Design-NET.com

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



H11B1/D

