



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

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 ($I_F = 1$ 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

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°C	P_D	150 1.41	mW 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°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, 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.

H11B1*

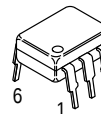
[CTR = 500% Min]

H11B3

[CTR = 100% Min]

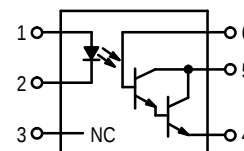
*Motorola Preferred Device

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

H11B1 H11B3

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 mA)	H11B1	V _F	—	1.15	1.5	Volts
Forward Voltage (I _F = 50 mA)	H11B3	V _F	—	1.34	1.5	Volts
Reverse Leakage Current (V _R = 3 V)	I _R	—	—	10		μA
Capacitance (V = 0 V, f = 1 MHz)	C _J	—	18	—		pF

OUTPUT DETECTOR

Collector–Emitter Dark Current ($V_{CE} = 10\text{ V}$)	I_{CEO}	—	5	100	nA
Collector–Emitter Breakdown Voltage ($I_C = 10\text{ mA}$)	$V_{(BR)CEO}$	25	80	—	Volts
Collector–Base Breakdown Voltage ($I_C = 100\text{ }\mu\text{A}$)	$V_{(BR)CBO}$	30	100	—	Volts
Emitter–Collector Breakdown Voltage ($I_E = 100\text{ }\mu\text{A}$)	$V_{(BR)ECO}$	7	—	—	Volts
DC Current Gain ($I_C = 5\text{ mA}$, $V_{CE} = 5\text{ V}$) (Typical Value)	h_{FE}	—	16K	—	—
Collector–Emitter Capacitance ($f = 1\text{ MHz}$, $V_{CE} = 5\text{ V}$)	C_{CE}	—	4.9	—	pF
Collector–Base Capacitance ($f = 1\text{ MHz}$, $V_{CB} = 5\text{ V}$)	C_{CB}	—	6.3	—	pF
Emitter–Base Capacitance ($f = 1\text{ MHz}$, $V_{EB} = 5\text{ V}$)	C_{EB}	—	3.8	—	pF

COUPLED

Output Collector Current ($I_F = 1\text{ mA}$, $V_{CE} = 5\text{ V}$)	H11B1 H11B3	I_C (CTR) ⁽²⁾	5 (500) 1 (100)	—	—	mA (%)
Collector–Emitter Saturation Voltage ($I_C = 1\text{ mA}$, $I_F = 1\text{ mA}$)	$V_{CE(sat)}$	—	0.7	1	—	Volts
Turn–On Time ($I_F = 5\text{ mA}$, $V_{CC} = 10\text{ V}$, $R_L = 100\text{ }\Omega$) ⁽³⁾	t_{on}	—	3.5	—	—	μs
Turn–Off Time ($I_F = 5\text{ mA}$, $V_{CC} = 10\text{ V}$, $R_L = 100\text{ }\Omega$) ⁽³⁾	t_{off}	—	95	—	—	μs
Rise Time ($I_F = 5\text{ mA}$, $V_{CC} = 10\text{ V}$, $R_L = 100\text{ }\Omega$) ⁽³⁾	t_r	—	1	—	—	μs
Fall Time ($I_F = 5\text{ mA}$, $V_{CC} = 10\text{ V}$, $R_L = 100\text{ }\Omega$) ⁽³⁾	t_f	—	2	—	—	μs
Isolation Voltage ($f = 60\text{ Hz}$, $t = 1\text{ sec}$) ⁽⁴⁾	V_{ISO}	7500	—	—	—	Vac(pk)
Isolation Resistance ($V = 500\text{ V}$) ⁽⁴⁾	R_{ISO}	10^{11}	—	—	—	Ω
Isolation Capacitance ($V = 0\text{ V}$, $f = 1\text{ MHz}$) ⁽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 11.
4. For this test, Pins 1 and 2 are common, and Pins 4, 5 and 6 are common.

TYPICAL CHARACTERISTICS

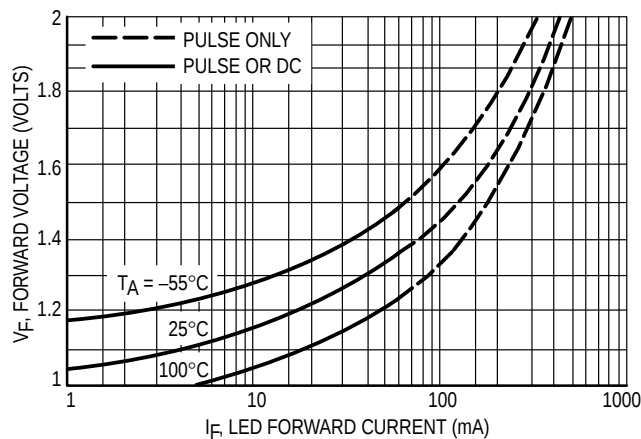


Figure 1. LED Forward Voltage versus Forward Current

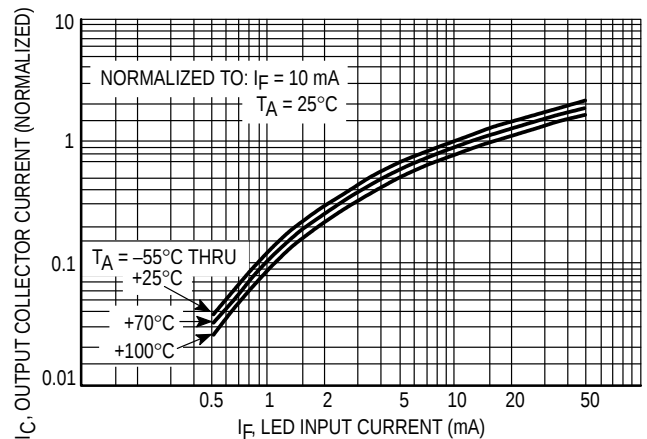


Figure 2. Output Current versus Input Current

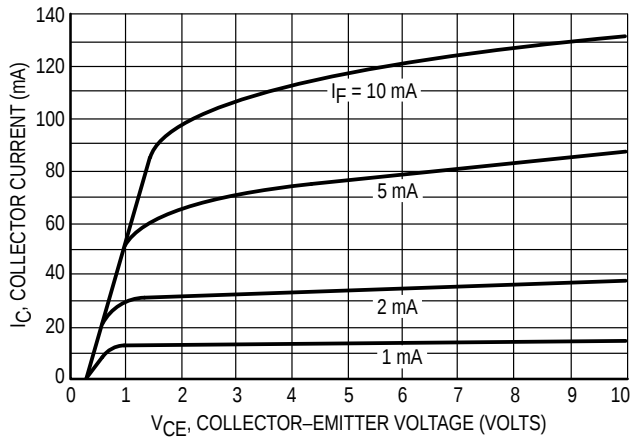


Figure 3. Collector Current versus Collector-Emitter Voltage

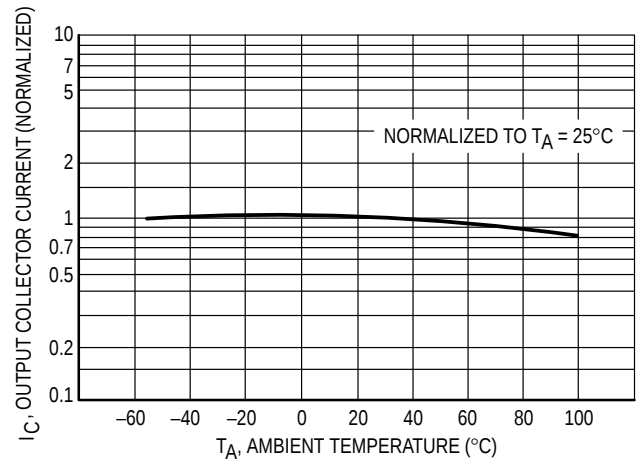


Figure 4. Output Current versus Ambient Temperature

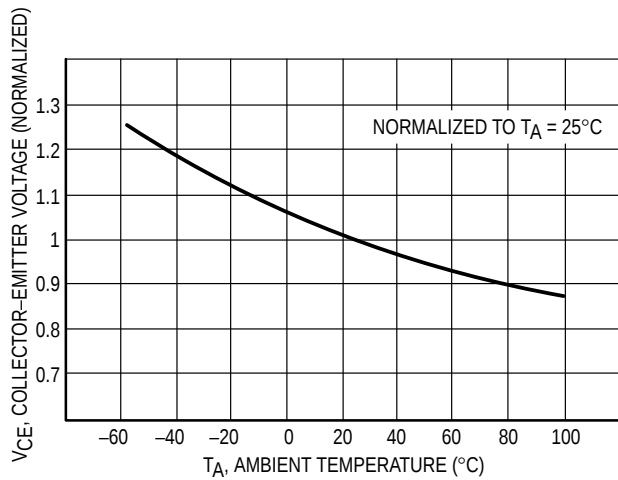


Figure 5. Collector-Emitter Voltage versus Ambient Temperature

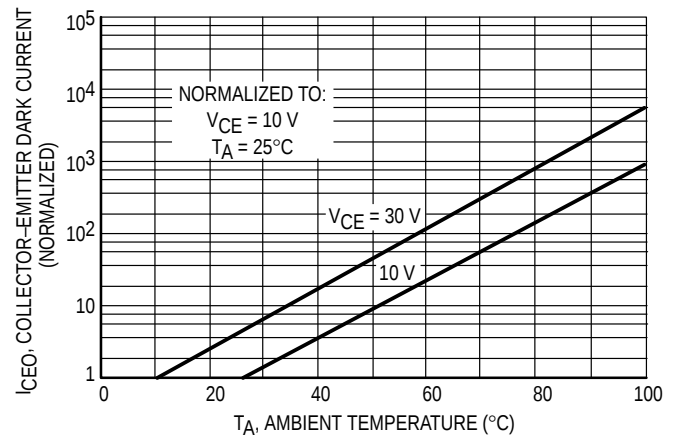


Figure 6. Collector-Emitter Dark Current versus Ambient Temperature

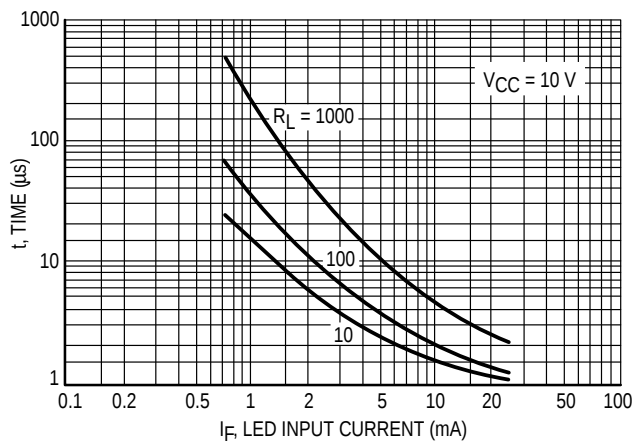


Figure 7. Turn-On Switching Times (Typical Values)

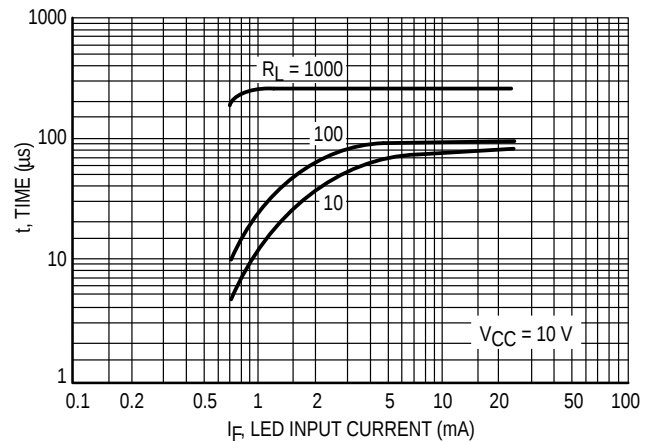


Figure 8. Turn-Off Switching Times (Typical Values)

H11B1 H11B3

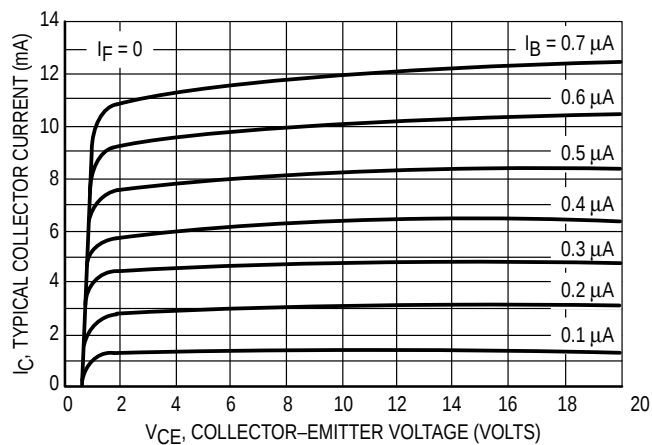


Figure 9. DC Current Gain (Detector Only)

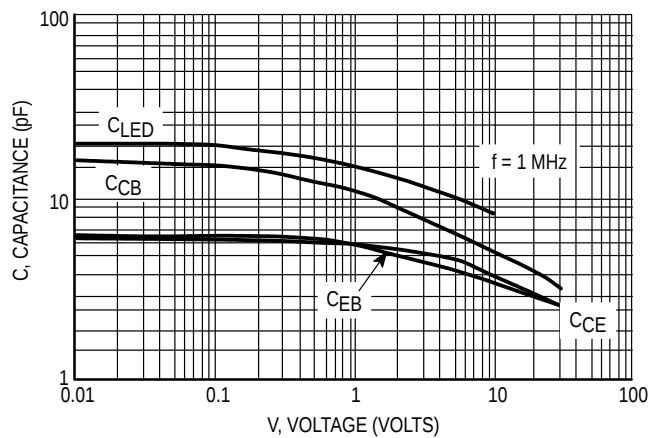


Figure 10. Capacitance versus Voltage

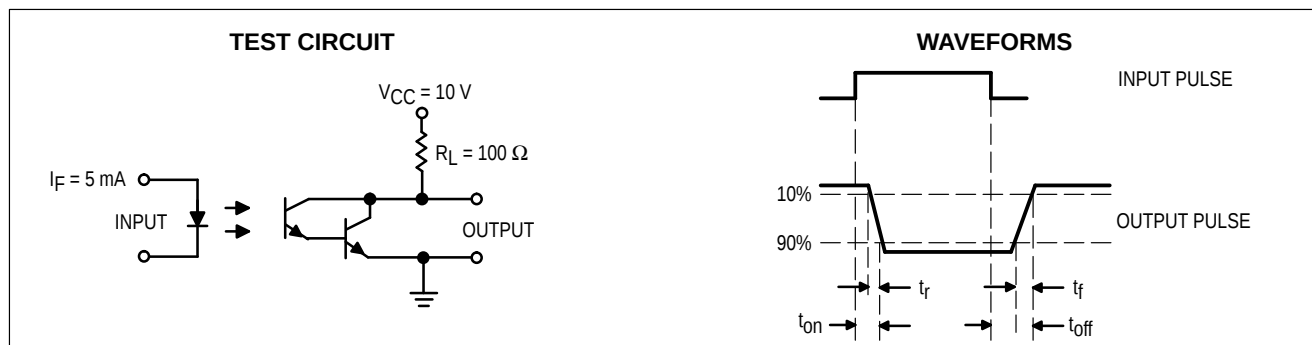
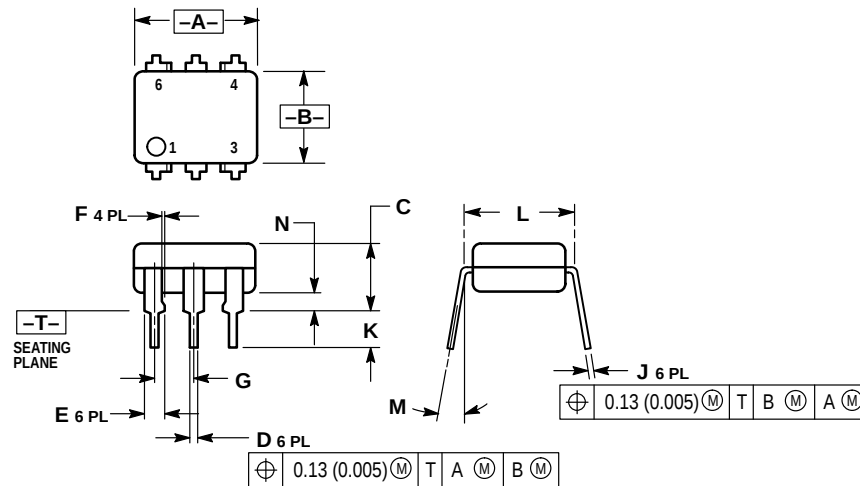


Figure 11. Switching Time Test Circuit and Waveforms

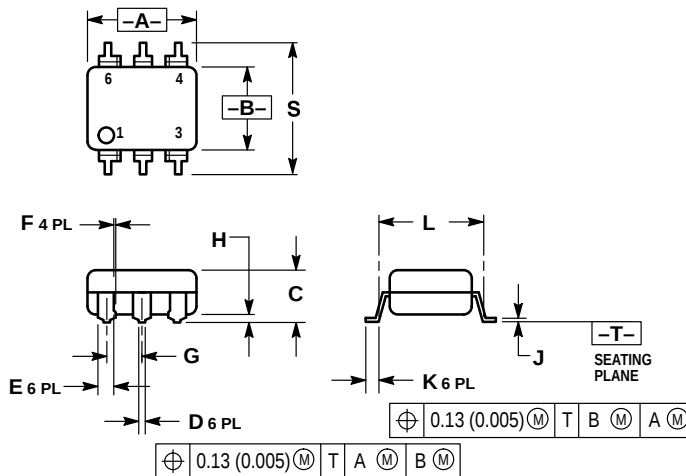
PACKAGE DIMENSIONS


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

**CASE 730A-04
ISSUE G**



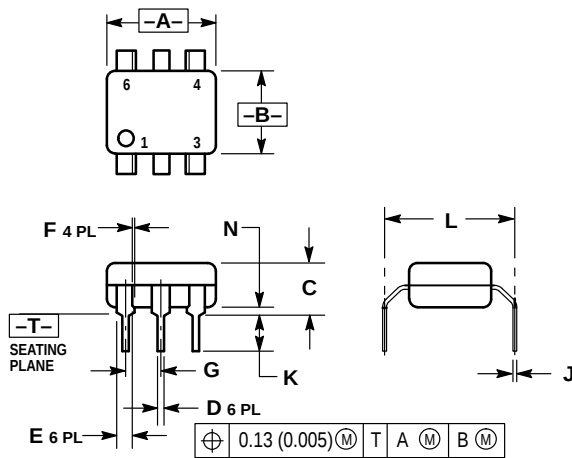
- NOTES:
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 2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	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		
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**

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

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



H11B1/D

