

MOTOROLA SEMICONDUCTOR TECHNICAL DATA



6-Pin DIP Optoisolators Logic Output

The H11L1 and H11L2 have a gallium arsenide IRED optically coupled to a high-speed integrated detector with Schmitt trigger output. Designed for applications requiring electrical isolation, fast response time, noise immunity and digital logic compatibility.

- Guaranteed Switching Times — $t_{on}, t_{off} < 4 \mu s$
- Built-In On/Off Threshold Hysteresis
- High Data Rate, 1 MHz Typical (NRZ)
- Wide Supply Voltage Capability
- Microprocessor Compatible Drive
- *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

- Interfacing Computer Terminals to Peripheral Equipment
- Digital Control of Power Supplies
- Line Receiver — Eliminates Noise
- Digital Control of Motors and Other Servo Machine Applications
- Logic to Logic Isolator
- Logic Level Shifter — Couples TTL to CMOS

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

Rating	Symbol	Value	Unit
INPUT LED			
Reverse Voltage	V_R	6	Volts
Forward Current — Continuous — Peak Pulse Width = 300 μs , 2% Duty Cycle	I_F	60 1.2	mA Amp
LED Power Dissipation @ $T_A = 25^\circ C$ Derate above $25^\circ C$	P_D	120 1.41	mW mW/ $^\circ C$
OUTPUT DETECTOR			
Output Voltage Range	V_O	0–16	Volts
Supply Voltage Range	V_{CC}	3–16	Volts
Output Current	I_O	50	mA
Detector Power Dissipation @ $T_A = 25^\circ C$ Derate above $25^\circ C$	P_D	150 1.76	mW mW/ $^\circ C$
TOTAL DEVICE			
Total Device Dissipation @ $T_A = 25^\circ C$ Derate above $25^\circ C$	P_D	250 2.94	mW mW/ $^\circ C$
Maximum Operating Temperature ⁽²⁾	T_A	–40 to +85	$^\circ C$
Storage Temperature Range ⁽²⁾	T_{stg}	–55 to +150	$^\circ C$
Soldering Temperature (10 s)	T_L	260	$^\circ C$
Isolation Surge Voltage (Pk ac Voltage, 60 Hz, 1 Second Duration) ⁽¹⁾	V_{ISO}	7500	Vac(pk)

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.

H11L1*
[$I_F(on) = 1.6 \text{ mA Max}$]
H11L2
[$I_F(on) = 10 \text{ mA Max}$]

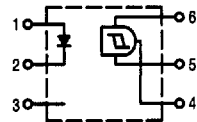
*Motorola Preferred Device

STYLE 5 PLASTIC



STANDARD THRU HOLE
CASE 730A–04

SCHEMATIC



- PIN 1. ANODE
2. CATHODE
3. NC
4. OPEN COLLECTOR OUTPUT
5. GND
6. V_{CC}

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

Characteristic	Symbol	Min	Typ ⁽¹⁾	Max	Unit	
INPUT LED						
Reverse Leakage Current ($V_R = 3\text{ V}$, $R_L = 1\text{ M}\Omega$)	I_R	—	0.05	10	μA	
Forward Voltage ($I_F = 10\text{ mA}$) ($I_F = 0.3\text{ mA}$)	V_F	— 0.75	1.2 0.95	1.5	Volts	
Capacitance ($V_R = 0\text{ V}$, $f = 1\text{ MHz}$)	C	—	18	—	pF	
OUTPUT DETECTOR						
Operating Voltage	V_{CC}	3	—	15	Volts	
Supply Current ($I_F = 0$, $V_{CC} = 5\text{ V}$)	$I_{CC}(\text{off})$	—	1	5	mA	
Output Current, High ($I_F = 0$, $V_{CC} = V_O = 15\text{ V}$)	I_{OH}	—	—	100	μA	
COUPLED						
Supply Current ($I_F = I_{F(\text{on})}$, $V_{CC} = 5\text{ V}$)	$I_{CC}(\text{on})$	—	1.6	5	mA	
Output Voltage, Low ($R_L = 270\ \Omega$, $V_{CC} = 5\text{ V}$, $I_F = I_{F(\text{on})}$)	V_{OL}	—	0.2	0.4	Volts	
Threshold Current, ON ($R_L = 270\ \Omega$, $V_{CC} = 5\text{ V}$)	$I_{F(\text{on})}$	— —	1.2 —	1.6 10	mA	
Threshold Current, OFF ($R_L = 270\ \Omega$, $V_{CC} = 5\text{ V}$)	$I_{F(\text{off})}$	0.3 0.3	0.75 —	— —	mA	
Hysteresis Ratio ($R_L = 270\ \Omega$, $V_{CC} = 5\text{ V}$)	$\frac{I_{F(\text{off})}}{I_{F(\text{on})}}$	0.5	0.75	0.9		
Isolation Voltage ⁽²⁾ 60 Hz, AC Peak, 1 second, $T_A = 25^\circ\text{C}$	V_{ISO}	7500	—	—	$\text{Vac}(\text{pk})$	
Turn-On Time	$R_L = 270\ \Omega^{(3)}$ $V_{CC} = 5\text{ V}$, $I_F = I_{F(\text{on})}$ $T_A = 25^\circ\text{C}$	t_{on}	—	1.2	4	μs
Fall Time		t_f	—	0.1	—	
Turn-Off Time		t_{off}	—	1.2	4	
Rise Time		t_r	—	0.1	—	

1. Always design to the specified minimum/maximum electrical limits (where applicable).
2. For this test, IRED Pins 1 and 2 are common and Output Gate Pins 4, 5, 6 are common.
3. R_L value effect on switching time is negligible.

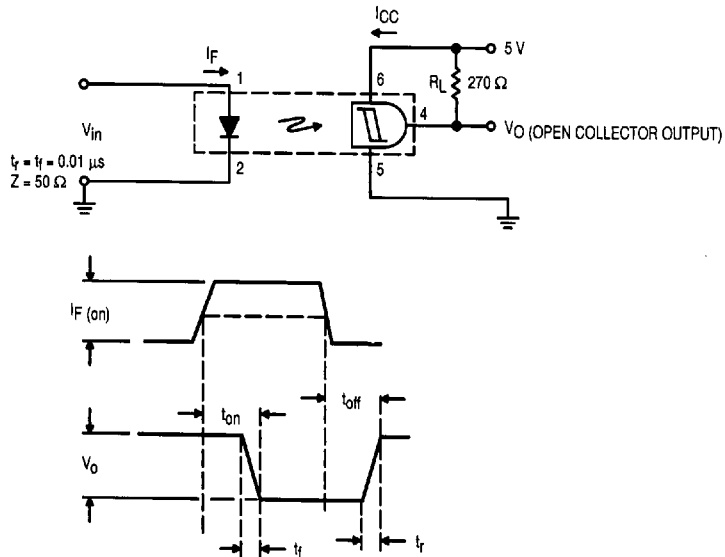


Figure 1. Switching Test Circuit

TYPICAL CHARACTERISTICS

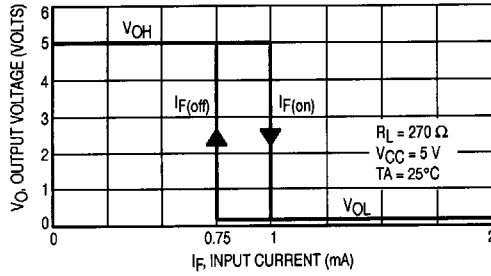


Figure 2. Transfer Characteristics for H11L1

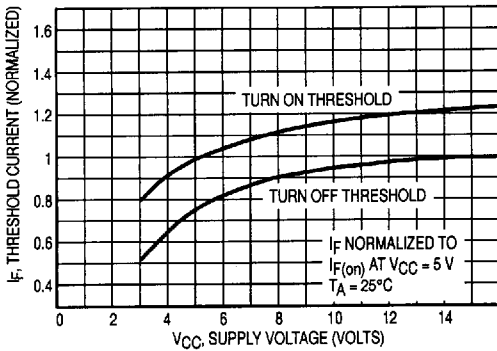


Figure 3. Threshold Current versus Supply Voltage

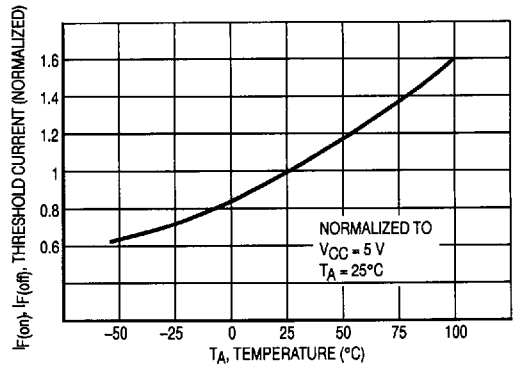


Figure 4. Threshold Current versus Temperature

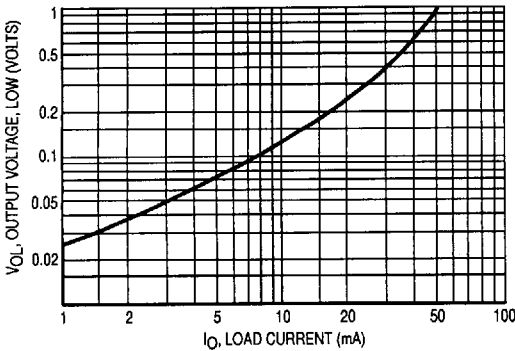


Figure 5. Output Voltage, Low versus Load Current

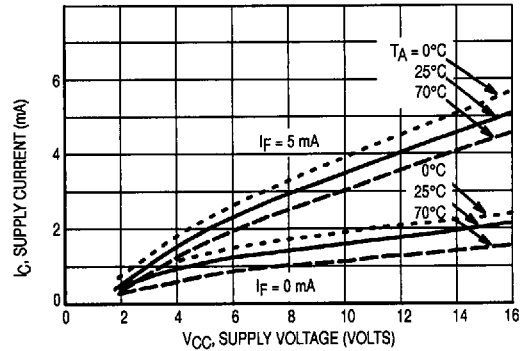
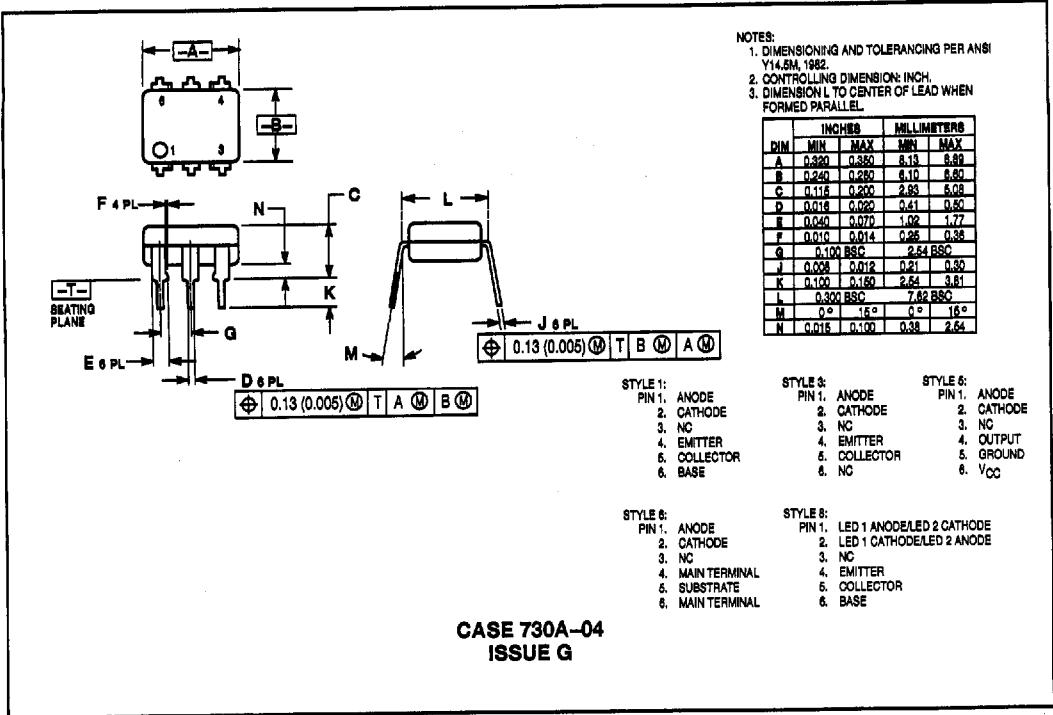
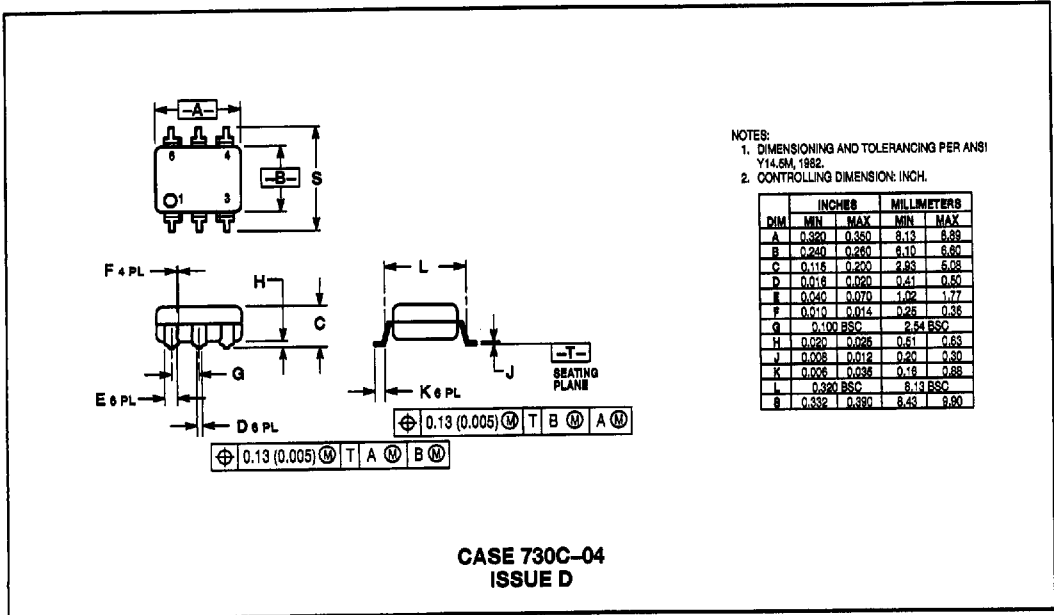


Figure 6. Supply Current versus Supply Voltage

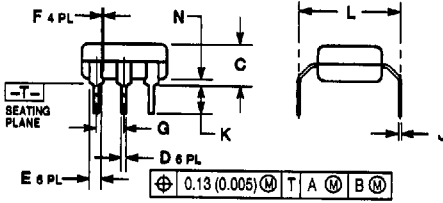
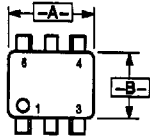
PACKAGE DIMENSIONS



**CASE 730A-04
 ISSUE G**



**CASE 730C-04
 ISSUE D**

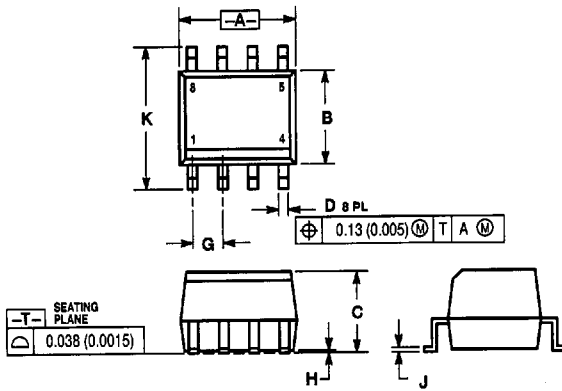


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.6M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.320	0.320	8.13	8.89
B	0.240	0.260	6.10	6.60
C	0.115	0.200	2.93	5.08
D	0.018	0.020	0.41	0.50
E	0.040	0.070	1.02	1.77
F	0.070	0.074	0.25	0.38
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	0.915	0.940	23.88	24.40

**CASE 730D-05
ISSUE D**

PACKAGE DIMENSIONS



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

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.162	0.202	4.63	5.13
B	0.144	0.164	3.66	4.16
C	0.128	0.143	3.13	3.63
D	0.011	0.021	0.28	0.53
G	0.050 BSC		1.27 BSC	
H	0.003	0.008	0.08	0.20
J	0.006	0.010	0.16	0.26
K	0.224	0.244	5.69	6.19

- | | | | |
|--|--|--|---|
| <p>STYLE 1: (Single Channel)
 PIN 1. ANODE
 2. CATHODE
 3. NC
 4. NC
 5. EMITTER
 6. COLLECTOR
 7. BASE
 8. NC</p> | <p>STYLE 2: (AC Input)
 PIN 1. INPUT
 2. INPUT
 3. NC
 4. NC
 5. EMITTER
 6. COLLECTOR
 7. BASE
 8. NC</p> | <p>STYLE 3: (Dual Channel)
 PIN 1. ANODE 1
 2. CATHODE 1
 3. ANODE 2
 4. CATHODE 2
 5. EMITTER 2
 6. COLLECTOR 2
 7. EMITTER 1
 8. COLLECTOR 1</p> | <p>STYLE 4: (Single Channel-Baseless)
 PIN 1. ANODE
 2. CATHODE
 3. NC
 4. NC
 5. EMITTER
 6. COLLECTOR
 7. NC
 8. NC</p> |
|--|--|--|---|

**CASE 846-01
 ISSUE B**