



## 6-Pin DIP Optoisolators AC Input/Transistor Output

The H11AA1, H11AA2, H11AA3, H11AA4 devices consist of two gallium–arsenide infrared emitting diodes connected in inverse parallel, optically coupled to a monolithic silicon phototransistor detector.

- Built-In Protection for Reverse Polarity
- Guaranteed CTR Minimum Values as High as 100%
- Guaranteed Minimum/Maximum Symmetry Limits
- **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

- Detecting or Monitoring ac Signals
- AC Line/Digital Logic Isolation
- Programmable Controllers
- Interfacing and coupling systems of different potentials and impedances
- AC/DC — Input Modules

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

Rating	Symbol	Value	Unit
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#### INPUT LED

Forward Current — Continuous (RMS)	$I_F$	60	mA
LED Power Dissipation @ $T_A = 25^\circ\text{C}$ with Negligible Power in Output Detector Derate above $25^\circ\text{C}$	$P_D$	120	mW
		1.41	mW/ $^\circ\text{C}$

#### OUTPUT TRANSISTOR

Collector–Emitter Voltage	$V_{CEO}$	30	Volts
Emitter–Base Voltage	$V_{EBO}$	5	Volts
Collector–Base Voltage	$V_{CB0}$	70	Volts
Collector Current — Continuous	$I_C$	150	mA
Detector Power Dissipation @ $T_A = 25^\circ\text{C}$ with Negligible Power in Input LEDs 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	mW
		2.94	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.

**H11AA1\***  
[CTR = 20% Min]

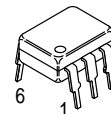
**H11AA2**  
[CTR = 10% Min]

**H11AA3**  
[CTR = 50% Min]

**H11AA4\***  
[CTR = 100% Min]

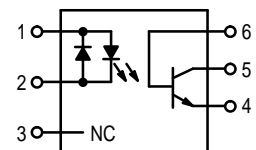
\*Motorola Preferred Devices

### STYLE 8 PLASTIC



STANDARD THRU HOLE  
CASE 730A–04

### SCHEMATIC



- PIN 1. INPUT LED
- 2. INPUT LED
- 3. NO CONNECTION
- 4. EMITTER
- 5. COLLECTOR
- 6. BASE

# H11AA1 H11AA2 H11AA3 H11AA4

## 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, either direction)	H11AA1,3,4 H11AA2 T <sub>A</sub> = -55°C T <sub>A</sub> = 100°C All devices All devices	V <sub>F</sub>	— — — —	1.15 1.15 1.3 1.05	1.5 1.8 — —	Volts
Capacitance (V = 0 V, f = 1 MHz)		C <sub>J</sub>	—	20	—	pF

## OUTPUT TRANSISTOR

Collector–Emitter Dark Current (V <sub>CE</sub> = 10 V)	H11AA1,3,4 H11AA2 T <sub>A</sub> = 100°C All devices	I <sub>CEO</sub>	— — —	1 1 1	100 200 —	nA nA μA
Collector–Base Dark Current (V <sub>CB</sub> = 10 V)		I <sub>CBO</sub>	—	0.2	—	nA
Collector–Emitter Breakdown Voltage (I <sub>C</sub> = 10 mA)		V <sub>(BR)CEO</sub>	30	45	—	Volts
Collector–Base Breakdown Voltage (I <sub>C</sub> = 100 μA)		V <sub>(BR)CBO</sub>	70	100	—	Volts
Emitter–Collector Breakdown Voltage (I <sub>E</sub> = 100 μA)		V <sub>(BR)ECO</sub>	5	7.8	—	Volts
DC Current Gain (I <sub>C</sub> = 2 mA, V <sub>CE</sub> = 5 V) (Typical Value)		h <sub>FE</sub>	—	500	—	—
Collector–Emitter Capacitance (f = 1 MHz, V <sub>CE</sub> = 0 V)		C <sub>CE</sub>	—	1.7	—	pF
Collector–Base Capacitance (f = 1 MHz, V <sub>CB</sub> = 0 V)		C <sub>CB</sub>	—	20	—	pF
Emitter–Base Capacitance (f = 1 MHz, V <sub>EB</sub> = 0 V)		C <sub>EB</sub>	—	10	—	pF

## COUPLED

Output Collector Current (I <sub>F</sub> = ± 10 mA, V <sub>CE</sub> = 10 V)	H11AA1 H11AA2 H11AA3 H11AA4	I <sub>C</sub> (CTR) <sup>(2)</sup>	2 (20) 1 (10) 5 (50) 10 (100)	5 (50) 2 (20) 10 (100) 15 (150)	— — — —	mA (%)
Output Collector Current Symmetry <sup>(3)</sup> $\left( \frac{I_C \text{ at } I_F = +10 \text{ mA, } V_{CE} = 10 \text{ V}}{I_C \text{ at } I_F = -10 \text{ mA, } V_{CE} = 10 \text{ V}} \right)$	H11AA1,3,4	—	0.33	—	3	—
Collector–Emitter Saturation Voltage (I <sub>C</sub> = 0.5 mA, I <sub>F</sub> = ± 10 mA)		V <sub>CE(sat)</sub>	—	0.1	0.4	Volts
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. This specification guarantees that the higher of the two I<sub>C</sub> readings will be no more than 3 times the lower at I<sub>F</sub> = 10 mA.
4. For this test, Pins 1 and 2 are common, and Pins 4, 5 and 6 are common.

TYPICAL CHARACTERISTICS

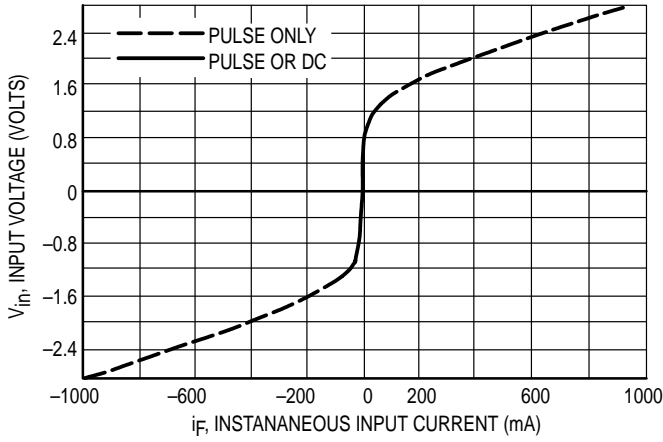


Figure 1. Input Voltage versus Input Current

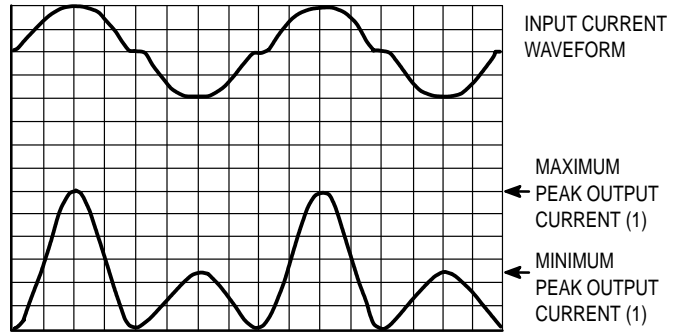


Figure 2. Output Characteristics

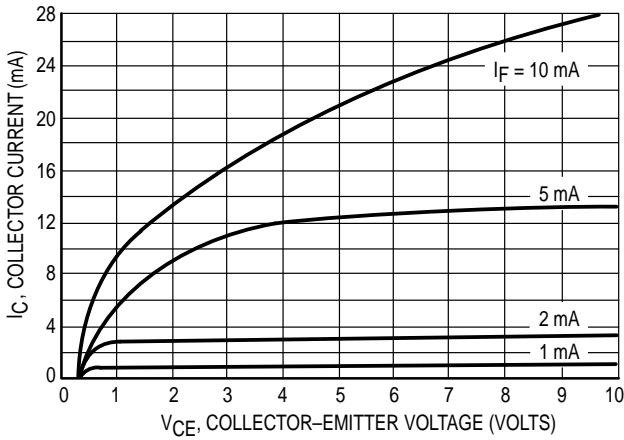


Figure 3. Collector Current versus Collector-Emitter Voltage

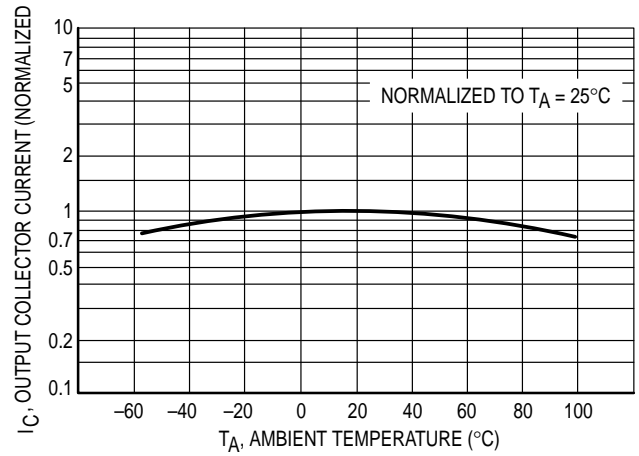


Figure 4. Output Current versus Ambient Temperature

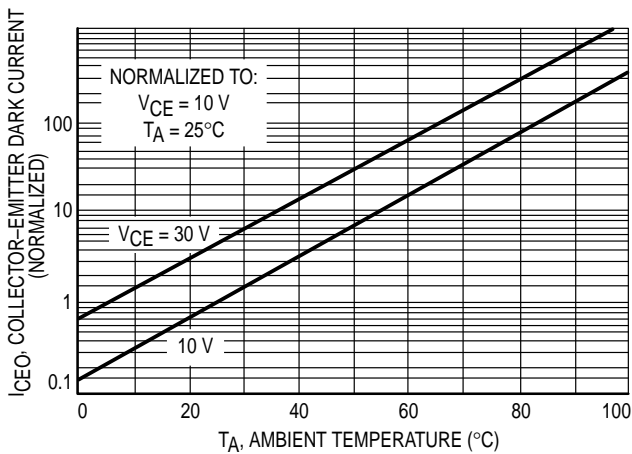


Figure 5. Dark Current versus Ambient Temperature

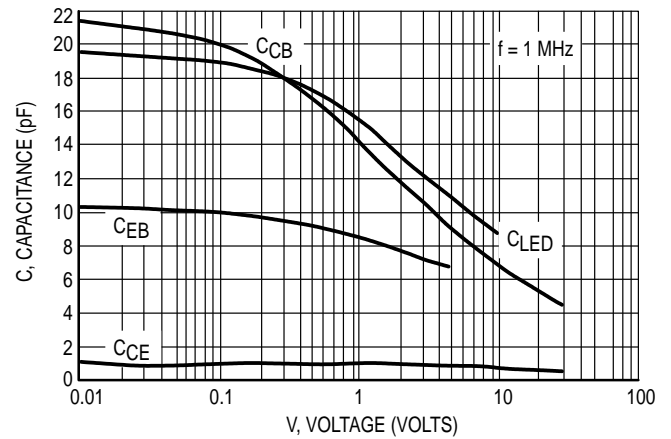


Figure 6. Capacitances versus Voltage

# H11AA1 H11AA2 H11AA3 H11AA4

## PACKAGE DIMENSIONS

SEATING PLANE

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 8:  
 PIN 1. LED 1 ANODE/LED 2 CATHODE  
 2. LED 1 CATHODE/LED 2 ANODE  
 3. NC  
 4. EMITTER  
 5. COLLECTOR  
 6. BASE

**CASE 730A-04  
ISSUE G**

SEATING PLANE

NOTES:

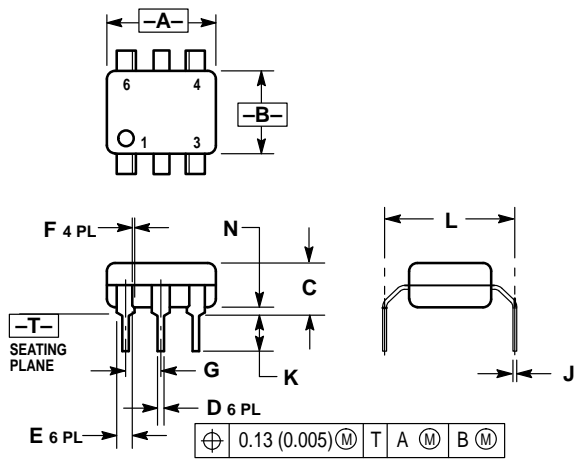
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DIM	INCHES		MILLIMETERS	
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B	0.240	0.260	6.10	6.60
C	0.115	0.200	2.93	5.08
D	0.016	0.020	0.41	0.50
E	0.040	0.070	1.02	1.77
F	0.010	0.014	0.25	0.36
G	0.100 BSC		2.54 BSC	
H	0.020	0.025	0.51	0.63
J	0.008	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**

**H11AA1 H11AA2 H11AA3 H11AA4**




- 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**

# H11AA1 H11AA2 H11AA3 H11AA4

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H11AA1/D

