



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°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°C	P_D	150	mW
		1.76	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	mW
		2.94	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.
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H11AA1*

[CTR = 20% Min]

H11AA2

[CTR = 10% Min]

H11AA3

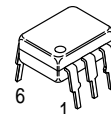
[CTR = 50% Min]

H11AA4*

[CTR = 100% Min]

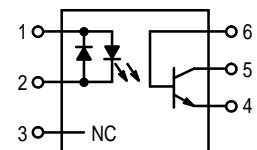
*Motorola Preferred Devices

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_A = 25°C unless otherwise noted)⁽¹⁾

Characteristic	Symbol	Min	Typ ⁽¹⁾	Max	Unit	
INPUT LED						
Forward Voltage (I _F = 10 mA, either direction)	H11AA1,3,4 H11AA2 T _A = -55°C T _A = 100°C	V _F	— — — —	1.15 1.15 1.3 1.05	1.5 1.8 — —	Volts
Capacitance (V = 0 V, f = 1 MHz)		C _J	—	20	—	pF

OUTPUT TRANSISTOR

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

COUPLED

Output Collector Current (I _F = ± 10 mA, V _{CE} = 10 V)	H11AA1 H11AA2 H11AA3 H11AA4	I _C (CTR) ⁽²⁾	2 (20) 1 (10) 5 (50) 10 (100)	5 (50) 2 (20) 10 (100) 15 (150)	— — — —	mA (%)
Output Collector Current Symmetry ⁽³⁾ $\left(\frac{I_C \text{ at } I_F = +10 \text{ mA, } V_{CE} = 10 \text{ V}}{I_C \text{ at } I_F = -10 \text{ mA, } V_{CE} = 10 \text{ V}} \right)$	H11AA1,3,4	—	0.33	—	3	—
Collector–Emitter Saturation Voltage (I _C = 0.5 mA, I _F = ± 10 mA)		V _{CE(sat)}	—	0.1	0.4	Volts
Isolation Voltage (f = 60 Hz, t = 1 sec) ⁽⁴⁾		V _{ISO}	7500	—	—	Vac(pk)
Isolation Resistance (V = 500 V) ⁽⁴⁾		R _{ISO}	10 ¹¹	—	—	Ω
Isolation Capacitance (V = 0 V, f = 1 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 × 100%.
3. This specification guarantees that the higher of the two I_C readings will be no more than 3 times the lower at I_F = 10 mA.
4. For this test, Pins 1 and 2 are common, and Pins 4, 5 and 6 are common.

TYPICAL CHARACTERISTICS

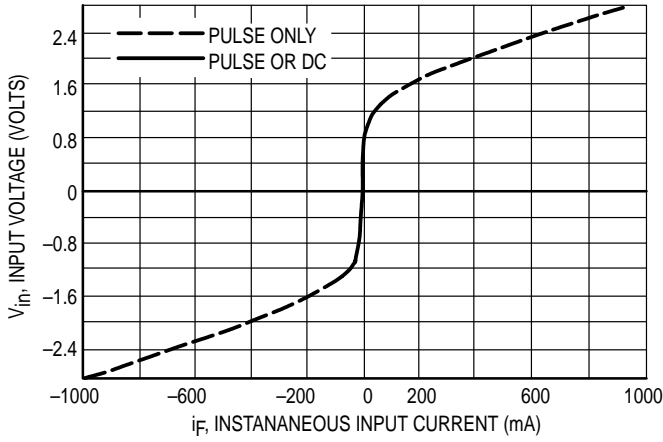


Figure 1. Input Voltage versus Input Current

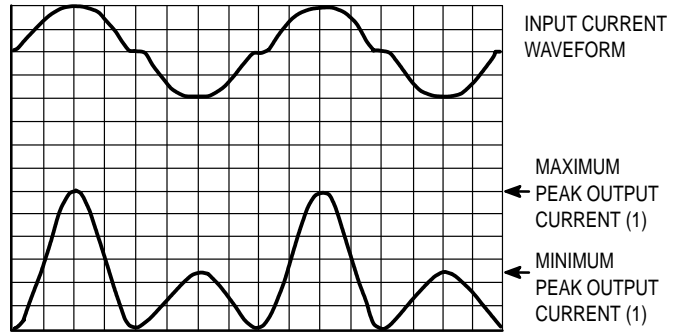


Figure 2. Output Characteristics

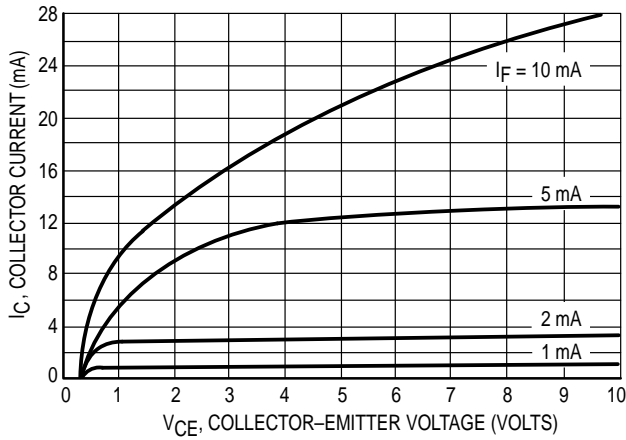


Figure 3. Collector Current versus Collector-Emitter Voltage

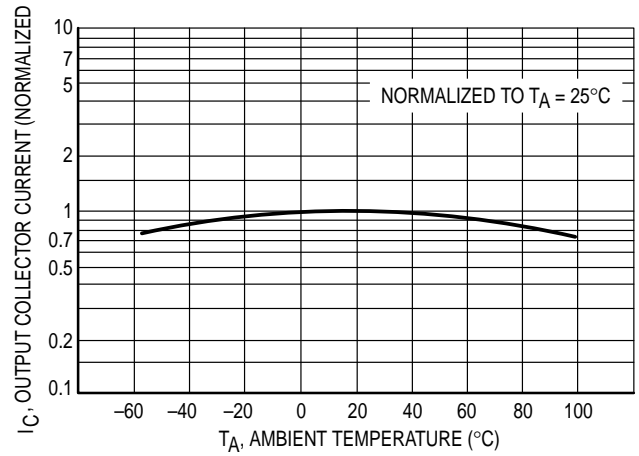


Figure 4. Output Current versus Ambient Temperature

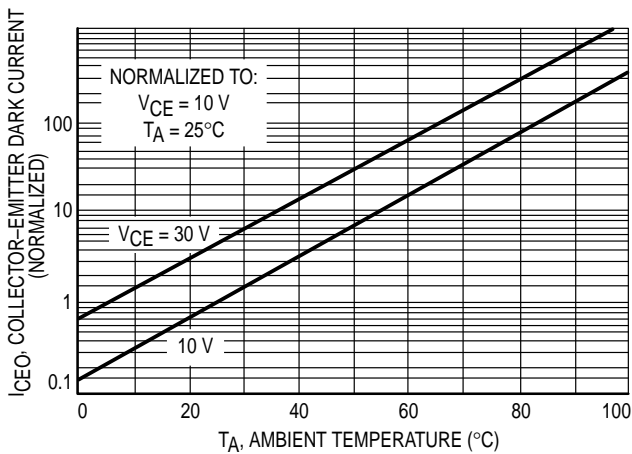


Figure 5. Dark Current versus Ambient Temperature

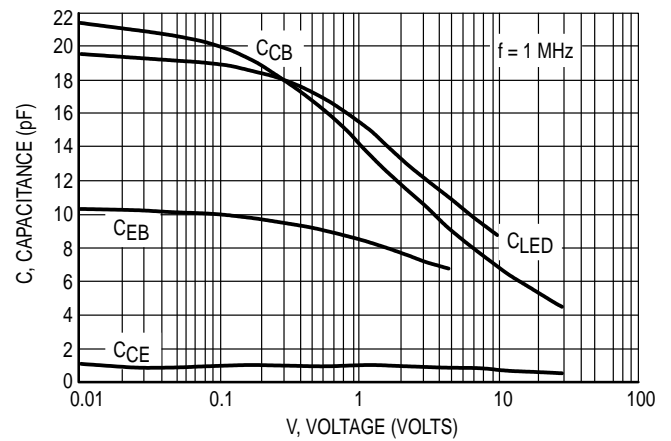


Figure 6. Capacitances versus Voltage

H11AA1 H11AA2 H11AA3 H11AA4

PACKAGE DIMENSIONS

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
- LED 1 CATHODE/LED 2 ANODE
- NC
- EMITTER
- COLLECTOR
- BASE

**CASE 730A-04
ISSUE G**

NOTES:

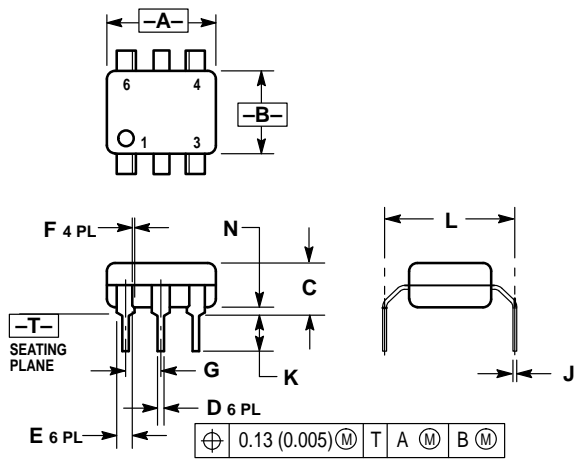
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

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	
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

