

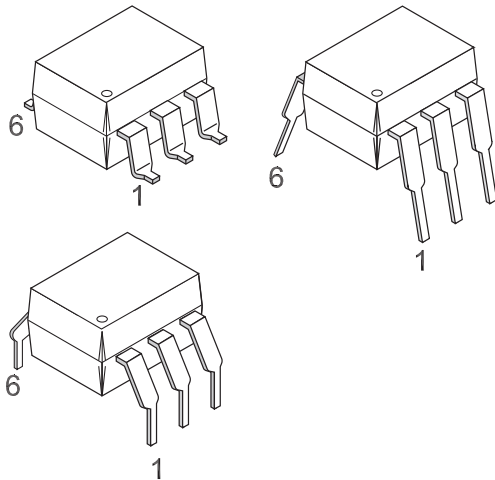
H11AA1-M

H11AA2-M

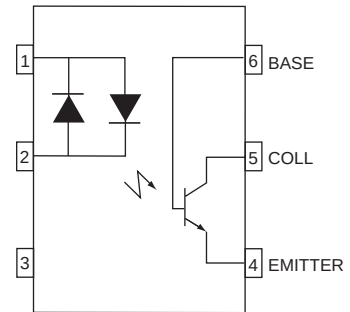
H11AA3-M

H11AA4-M

PACKAGE



SCHEMATIC



DESCRIPTION

The H11AAX-M series consists of two gallium-arsenide infrared emitting diodes connected in inverse parallel driving a single silicon phototransistor output.

FEATURES

- Bi-polar emitter input
- Built-in reverse polarity input protection
- Underwriters Laboratory (UL) recognized File #E90700, Volume 2
- VDE approved File #102497 (ordering option 'V')

APPLICATIONS

- AC line monitor
- Unknown polarity DC sensor
- Telephone line interface

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ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ Unless otherwise specified)

Parameter	Symbol	Device	Value	Units
TOTAL DEVICE				
Storage Temperature	T _{STG}	All	-40 to +150	°C
Operating Temperature	T _{OPR}	All	-40 to +100	°C
Lead Solder Temperature	T _{SOL}	All	260 for 10 sec	°C
Total Device Power Dissipation Derate Linearly From 25°C	P _D	All	250	mW
			2.94	mW/°C
EMITTER				
Continuous Forward Current	I _F	All	60	mA
Forward Current – Peak (1 μs pulse, 300 pps)	I _{F(pk)}	All	±1.0	A
LED Power Dissipation Derate Linearly From 25°C	P _D	All	120	mW
			1.41	mW/°C
DETECTOR				
Continuous Collector Current	I _C	All	50	mA
Detector Power Dissipation Derate linearity from 25°C	P _D	All	150	mW
			1.76	mW/°C

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ Unless otherwise specified.)

INDIVIDUAL COMPONENT CHARACTERISTICS

Parameter	Test Conditions	Symbol	Device	Min	Typ*	Max	Unit
EMITTER							
Input Forward Voltage	$I_F = \pm 10 \text{ mA}$	V_F	All		1.17	1.5	V
Capacitance	$V_F = 0 \text{ V}, f = 1.0 \text{ MHz}$	C_J	All		80		pF
DETECTOR							
Breakdown Voltage Collector to Emitter	$I_C = 1.0 \text{ mA}, I_F = 0$	BV_{CEO}	All	30	100		V
Collector to Base	$I_C = 100 \mu\text{A}, I_F = 0$	BV_{CBO}	All	70	120		V
Emitter to Base	$I_E = 100 \mu\text{A}, I_F = 0$	BV_{EBO}	All	5	10		V
Emitter to Collector	$I_E = 100 \mu\text{A}, I_F = 0$	BV_{ECO}	All	7	10		V
Leakage Current Collector to Emitter	$V_{CE} = 10 \text{ V}, I_F = 0$	I_{CEO}	H11AA1,3,4(-M)		1	50	nA
			H11AA2-M		1	200	
Capacitance Collector to Emitter	$V_{CE} = 0, f = 1 \text{ MHz}$	C_{CE}	All		10		pF
Collector to Base	$V_{CB} = 0, f = 1 \text{ MHz}$	C_{CB}	All		80		pF
Emitter to Base	$V_{EB} = 0, f = 1 \text{ MHz}$	C_{EB}	All		15		pF

*Typical values at $T_A = 25^\circ\text{C}$

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TRANSFER CHARACTERISTICS ($T_A = 25^\circ\text{C}$ Unless otherwise specified.)

Characteristics	Test Conditions	Symbol	Device	Min	Typ*	Max	Units
Current Transfer Ratio, Collector to Emitter	$I_F = \pm 10 \text{ mA}$, $V_{CE} = 10 \text{ V}$	CTR_{CE}	H11AA4-M	100			%
			H11AA3-M	50			
			H11AA1-M	20			
			H11AA2-M	10			
Current Transfer Ratio, Symmetry	$I_F = \pm 10 \text{ mA}$, $V_{CE} = 10 \text{ V}$ (Figure 11)		All	.33		3.0	
Saturation Voltage Collector to Emitter	$I_F = \pm 10 \text{ mA}$, $I_{CE} = 0.5 \text{ mA}$	$V_{CE(SAT)}$	All			.40	V

ISOLATION CHARACTERISTICS

Characteristic	Test Conditions	Symbol	Min	Typ*	Max	Units
Package Capacitance input/output	$V_{I-O} = 0$, $f = 1 \text{ MHz}$	C_{I-O}		0.7		pF
Isolation Voltage	$f = 60 \text{ Hz}$, $t = 1 \text{ sec.}$	V_{ISO}	7500			Vac(pk)
Isolation Resistance	$V_{I-O} = 500 \text{ VDC}$	R_{ISO}	10^{11}			Ω

*Typical values at $T_A = 25^\circ\text{C}$

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Fig. 1 Input Voltage vs. Input Current

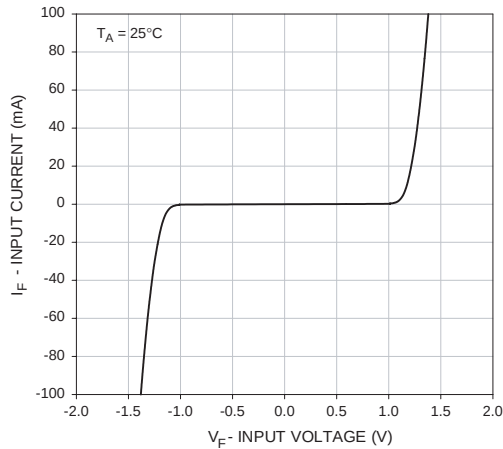


Fig. 2 Normalized CTR vs. Forward Current

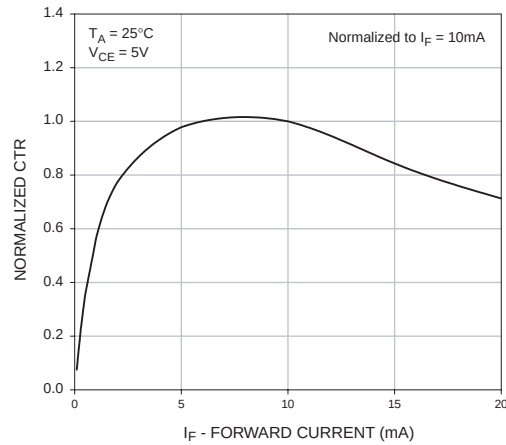


Fig. 3 Normalized CTR vs. Ambient Temperature

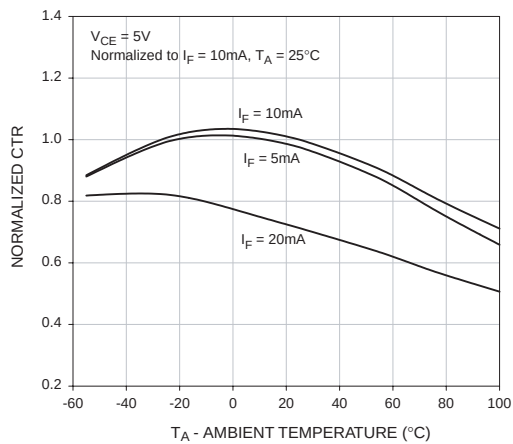


Fig. 4 CTR vs. RBE (Unsaturated)

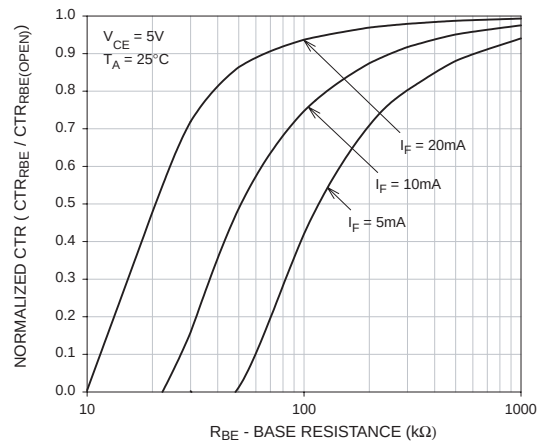


Fig. 5 CTR vs. RBE (Saturated)

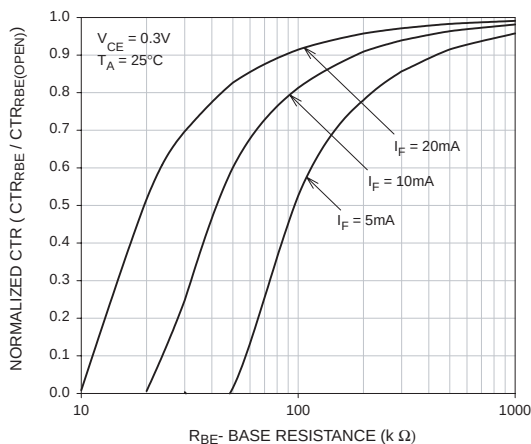
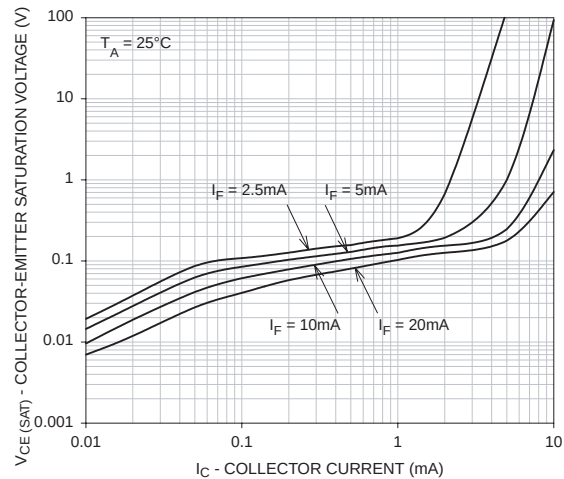


Fig. 6 Collector-Emitter Saturation Voltage vs. Collector Current



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Fig. 7 Switching Speed vs. Load Resistor

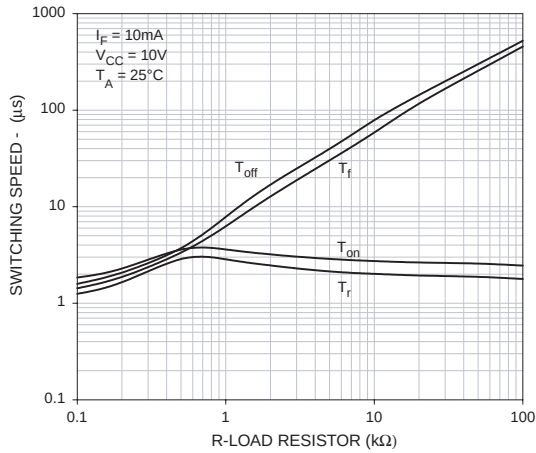


Fig. 8 Normalized t_{on} vs. R_{BE}

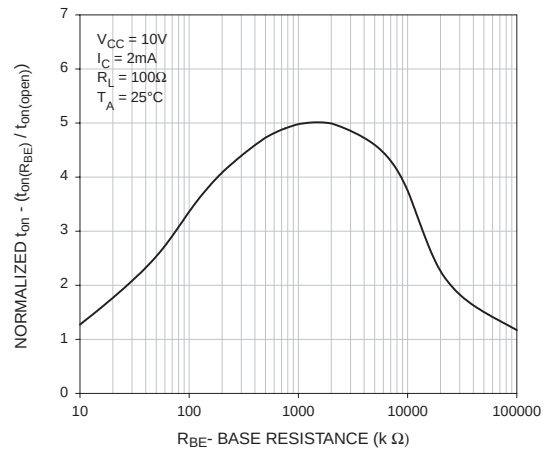


Fig. 9 Normalized t_{off} vs. R_{BE}

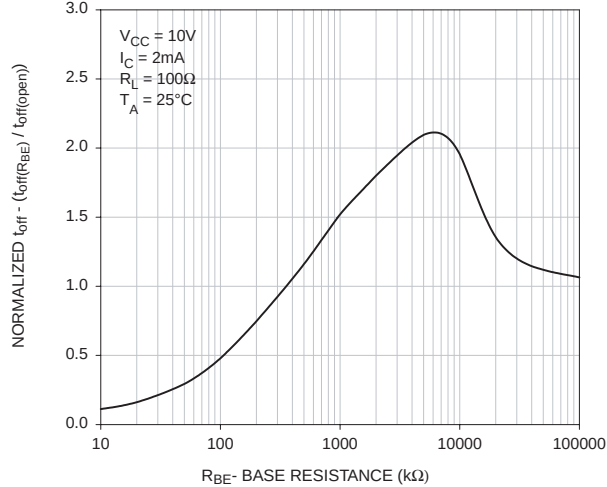


Fig. 10 Dark Current vs. Ambient Temperature

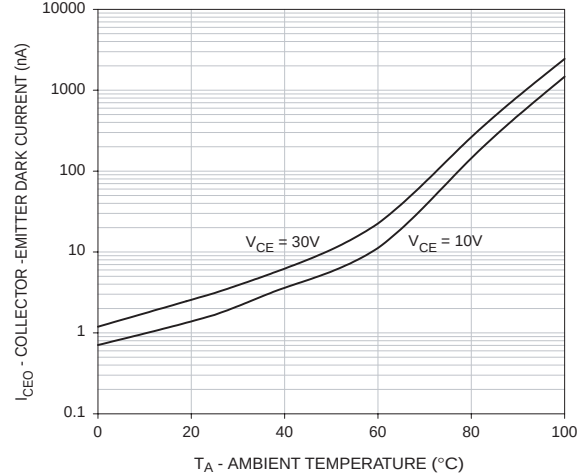
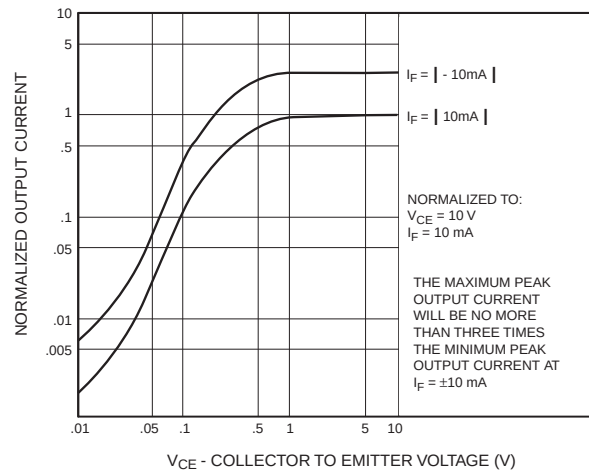


Fig. 11 Output Symmetry Characteristics



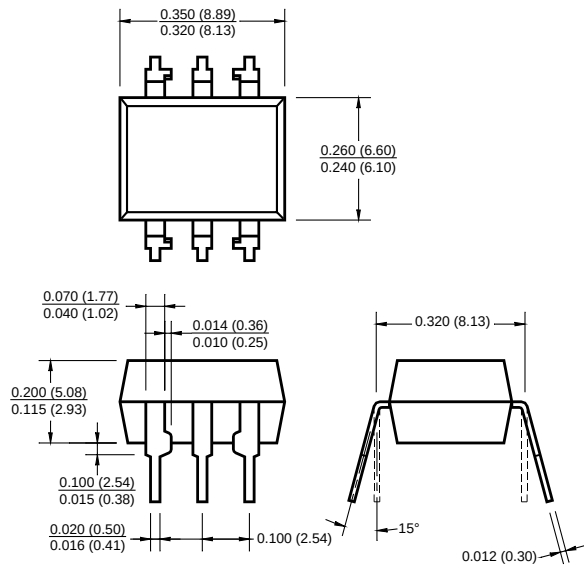
H11AA1-M

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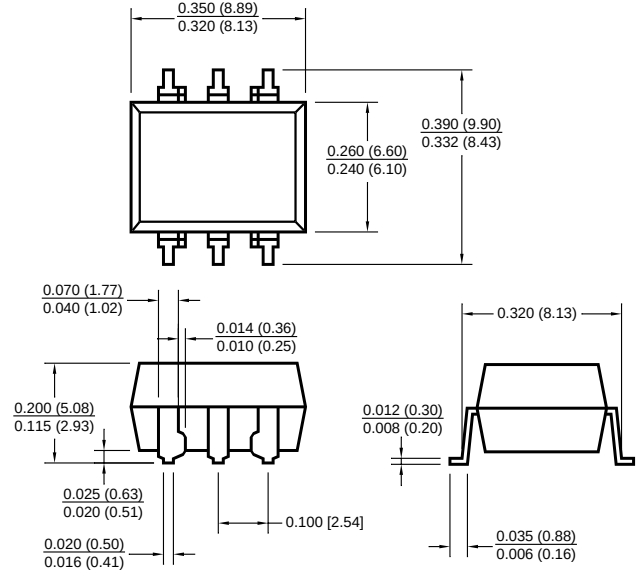
H11AA3-M

H11AA4-M

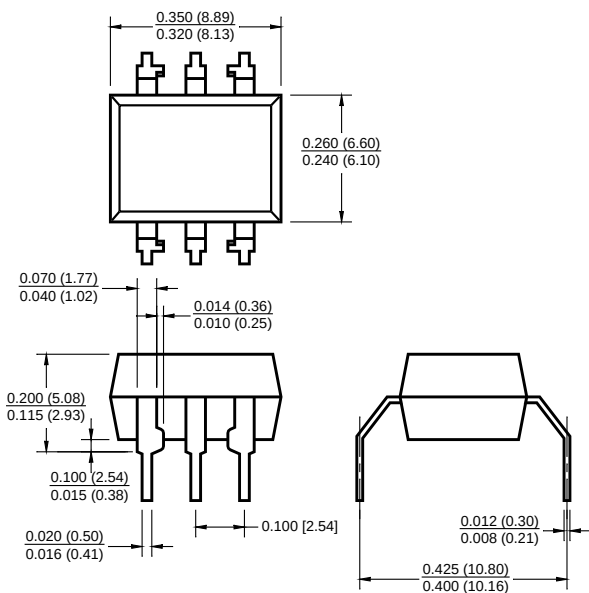
Package Dimensions (Through Hole)



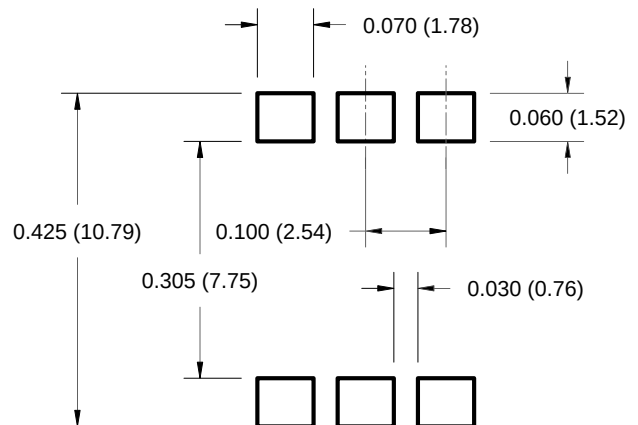
Package Dimensions (Surface Mount)



Package Dimensions (0.4" Lead Spacing)



**Recommended Pad Layout for
Surface Mount Leadform**



NOTE

All dimensions are in inches (millimeters)

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H11AA2-M

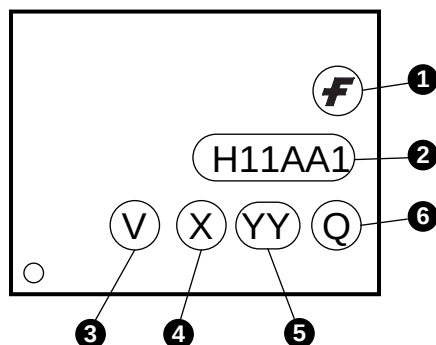
H11AA3-M

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ORDERING INFORMATION

Option/Order Entry Identifier	Description
S	Surface Mount Lead Bend
SR2	Surface Mount; Tape and Reel
T	0.4" Lead Spacing
V	VDE 0884
TV	VDE 0884, 0.4" Lead Spacing
SV	VDE 0884, Surface Mount
SR2V	VDE 0884, Surface Mount, Tape & Reel

MARKING INFORMATION



Definitions	
1	Fairchild logo
2	Device number
3	VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)
4	One digit year code, e.g., '3'
5	Two digit work week ranging from '01' to '53'
6	Assembly package code

*Note – Parts that do not have the 'V' option (see definition 3 above) that are marked with date code '325' or earlier are marked in portrait format.

[illegible]

All dimensions are in inches (millimeters)

- Peak reflow temperature: 245°C (package surface temperature)
- Time of temperature higher than 183°C for 120–180 seconds
- One time soldering reflow is recommended

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