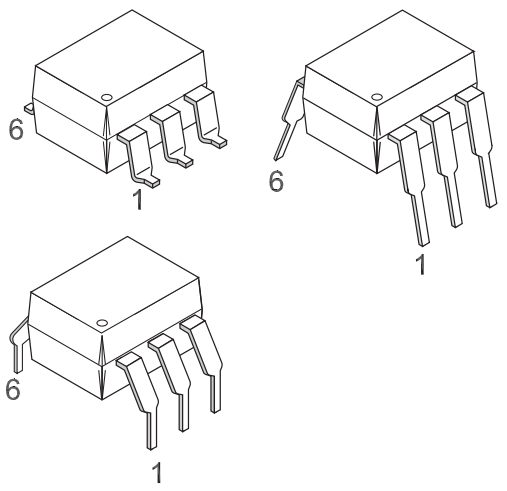
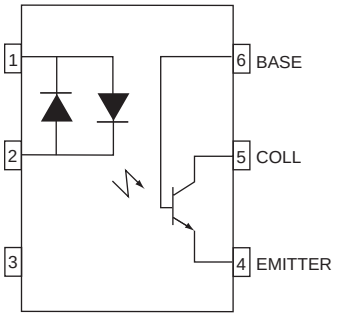
AC INPUT/PHOTOTRANSISTOR OPTOCOUPLERS

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

ABSOLUTE MAXIMUM RATINGS (T_A =25°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	P_D	All	250	mW
Derate Linearly From 25°C			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	P_D	All	120	mW
Derate Linearly From 25°C			1.41	mW/°C
DETECTOR				
Continuous Collector Current	I_C	All	50	mA
Detector Power Dissipation	P_D	All	150	mW
Derate linearity from 25°C			1.76	mW/°C

ELECTRICAL CHARACTERISTICS (T_A = 25°C Unless otherwise specified.)

INDIVIDUAL COMPONENT CHARACTERISTICS

Parameter	Test Conditions	Symbol	Device	Min	Typ*	Max	Unit
EMITTER							
Input Forward Voltage	I_F = ±10 mA	V_F	All		1.17	1.5	V
Capacitance	V_F = 0 V, f = 1.0 MHz	C_J	All		80		pF
DETECTOR							
Breakdown Voltage Collector to Emitter	I_C = 1.0 mA, I_F = 0	BV_{CEO}	All	30	100		V
Collector to Base	I_C = 100 µA, I_F = 0	BV_{CBO}	All	70	120		V
Emitter to Base	I_E = 100 µA, I_F = 0	BV_{EBO}	All	5	10		V
Emitter to Collector	I_E = 100 µA, I_F = 0	BV_{ECO}	All	7	10		V
Leakage Current Collector to Emitter	V_{CE} = 10 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 MHz	C_{CE}	All		10		pF
Collector to Base	V_{CB} = 0, f = 1 MHz	C_{CB}	All		80		pF
Emitter to Base	V_{EB} = 0, f = 1 MHz	C_{EB}	All		15		pF

*Typical values at T_A = 25°C

TRANSFER CHARACTERISTICS (T_A = 25°C Unless otherwise specified.)

Characteristics	Test Conditions	Symbol	Device	Min	Typ*	Max	Units
Current Transfer Ratio, Collector to Emitter	I_F = ±10 mA, V_{CE} = 10 V	CTR_{CE}	H11AA4-M	100			%
			H11AA3-M	50			
			H11AA1-M	20			
			H11AA2-M	10			
Current Transfer Ratio, Symmetry	I_F = ±10 mA, V_{CE} = 10 V (Figure 11)		All	.33		3.0	
Saturation Voltage Collector to Emitter	I_F = ±10 mA, I_{CE} = 0.5 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 MHz	C_{I-O}		0.7		pF
Isolation Voltage	f = 60 Hz, t = 1 sec.	V_{ISO}	7500			Vac(pk)
Isolation Resistance	V_{I-O} = 500 VDC	R_{ISO}	10^{11}			Ω

*Typical values at T_A = 25°C

Fig. 1 Input Voltage vs. Input Current

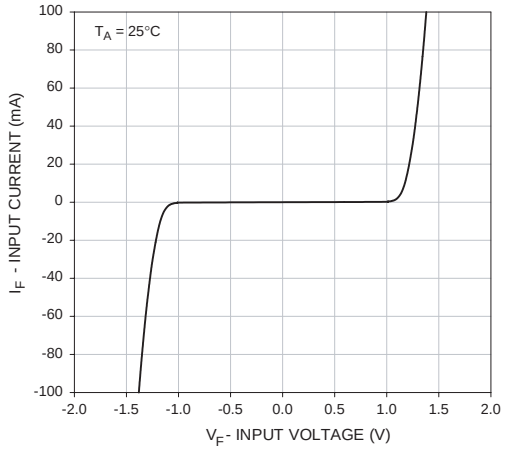


Fig. 2 Normalized CTR vs. Forward Current

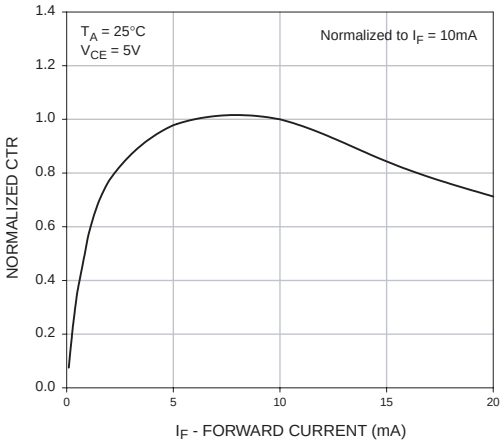


Fig. 3 Normalized CTR vs. Ambient Temperature

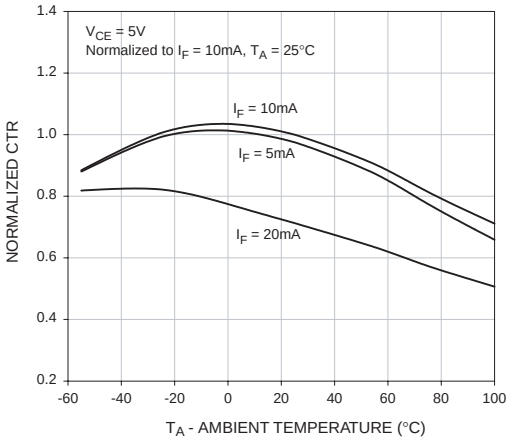


Fig. 4 CTR vs. RBE (Unsaturated)

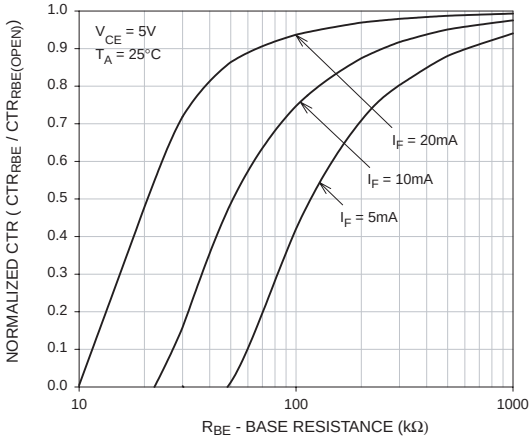


Fig. 5 CTR vs. RBE (Saturated)

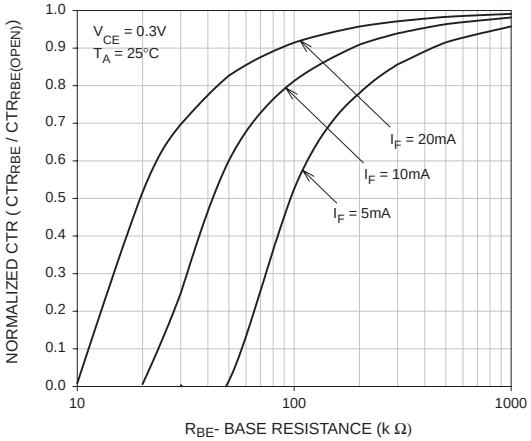


Fig. 6 Collector-Emitter Saturation Voltage vs Collector Current

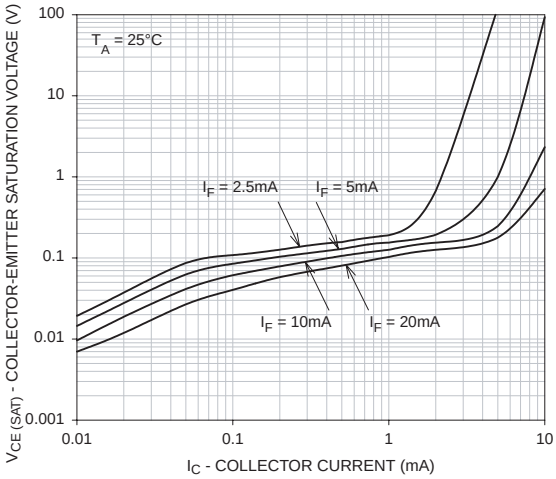


Fig. 7 Switching Speed vs. Load Resistor

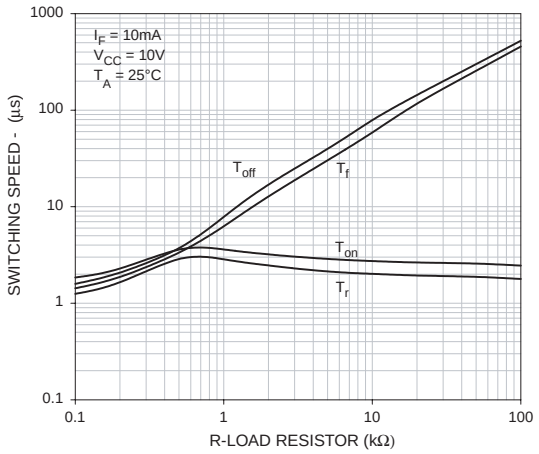


Fig. 8 Normalized t_{on} vs. R_{BE}

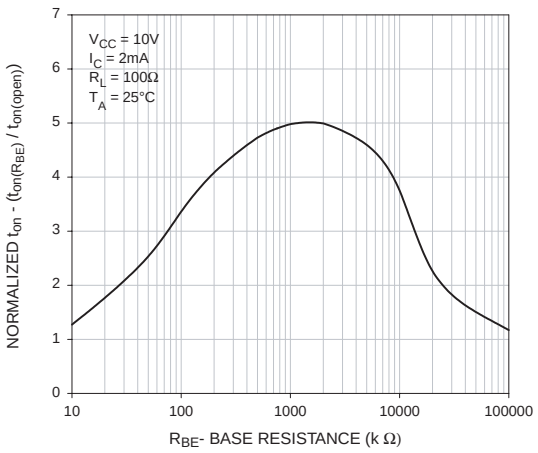


Fig. 9 Normalized t_{off} vs. R_{BE}

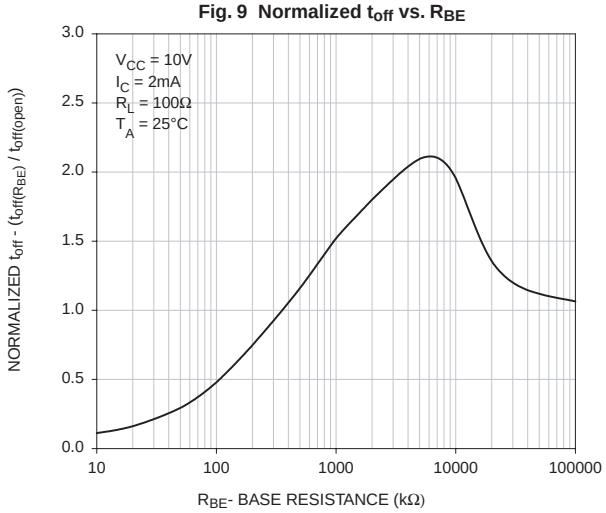


Fig. 10 Dark Current vs. Ambient Temperature

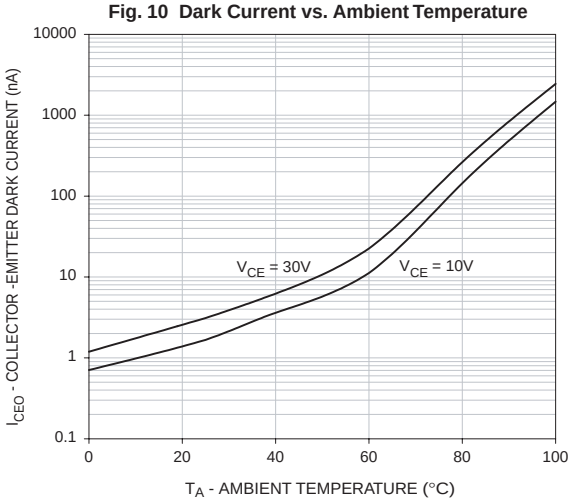
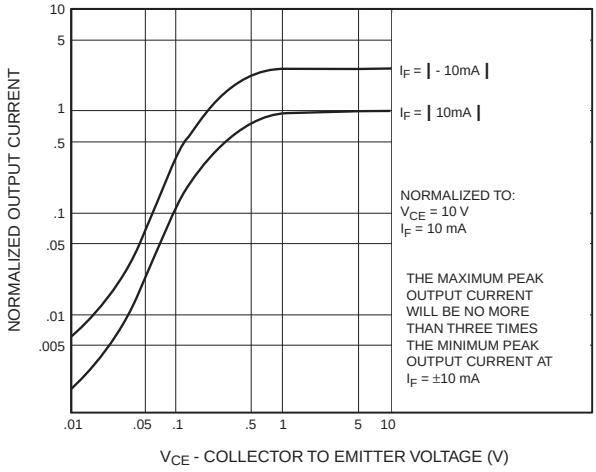
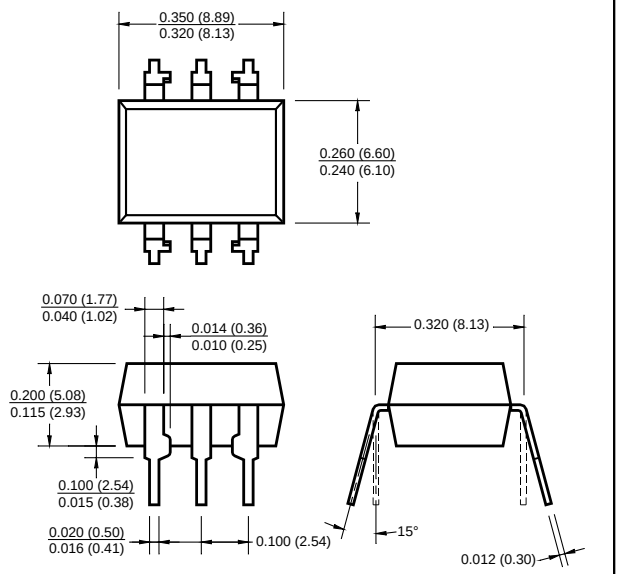


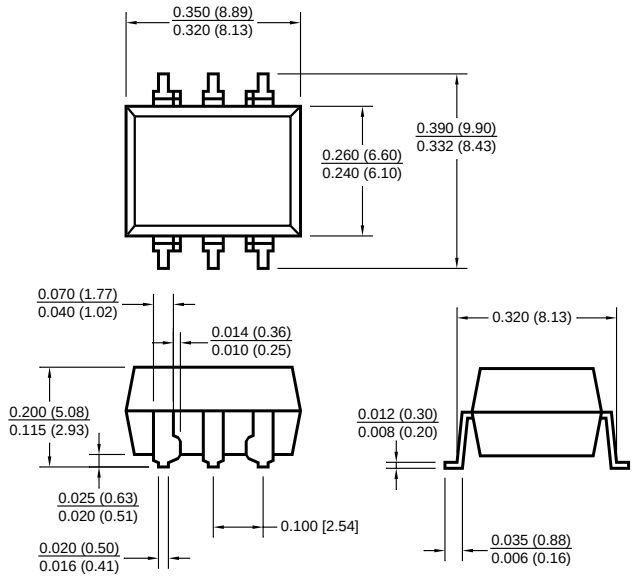
Fig. 11 Output Symmetry Characteristics



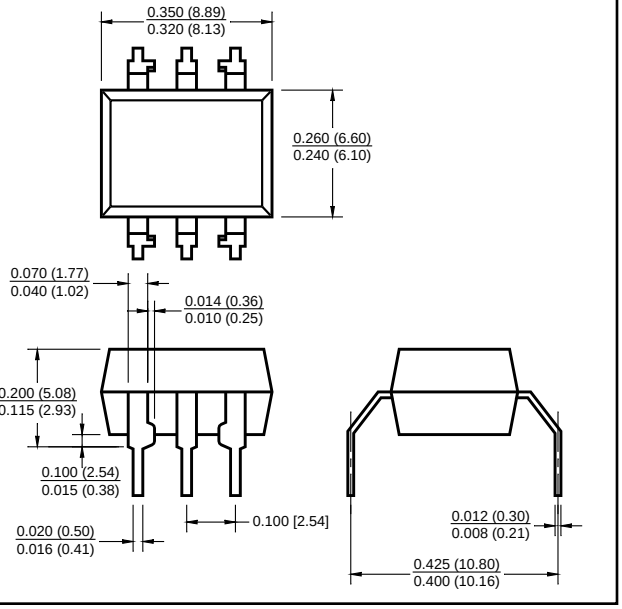
Package Dimensions (Through Hole)



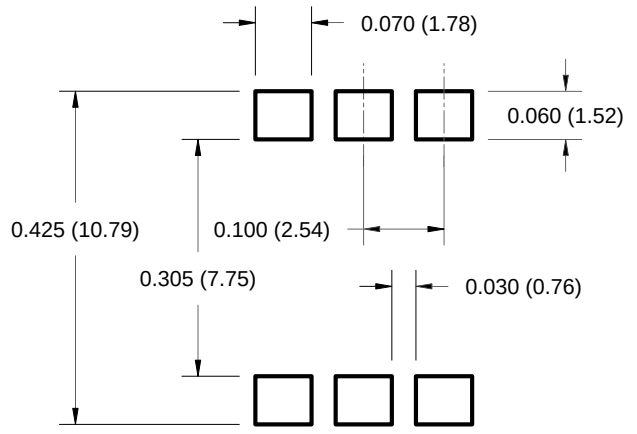
Package Dimensions (Surface Mount)



Package Dimensions (0.4” Lead Spacing)



Recommended Pad Layout for Surface Mount Leadform

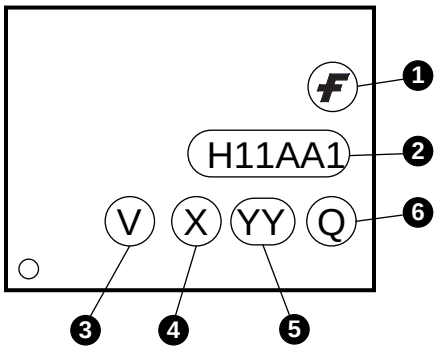


NOTE
All dimensions are in inches (millimeters)

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

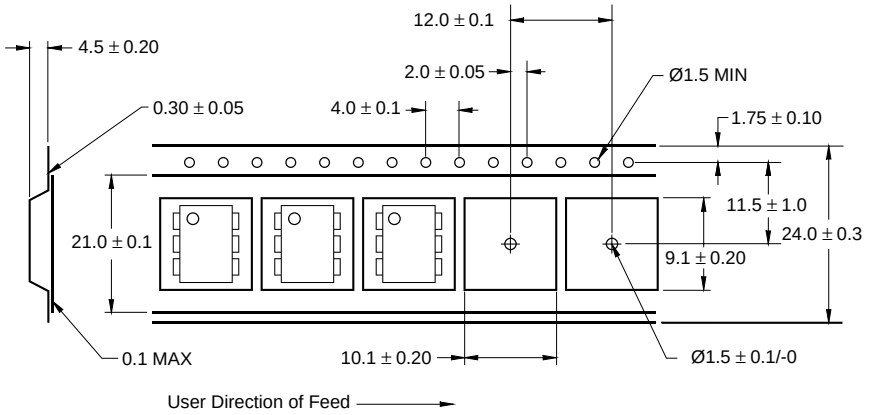
MARKING INFORMATION



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

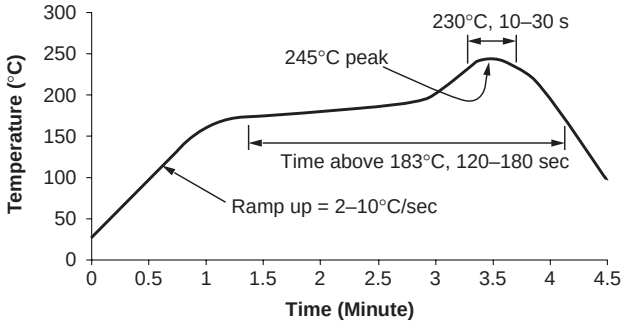
*Note – Parts that do not have the 'V' option (see definition 3 above) that are marked with date code '325' or earlier are marked in portrait format.

Carrier Tape Specifications



NOTE
All dimensions are in inches (millimeters)

Reflow Profile (White Package, -M Suffix)



- 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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