

H11AA1

H11AA3

H11AA2

H11AA4

**DESCRIPTION**

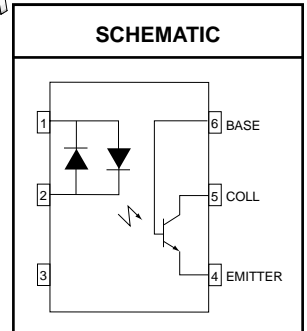
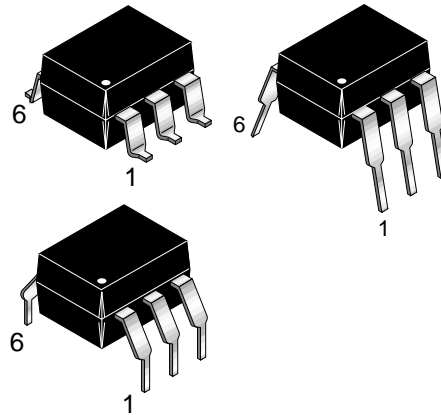
The H11AAX series consists of two gallium-arsenide infrared emitting diodes connected in inverse parallel driving a single silicon phototransistor output.

**FEATURES**

- Bi-polar emitter input
- Built-in reverse polarity input protection
- Underwriters Laboratory (UL) recognized — File #E90700
- VDE approved — File #E94766 (ordering option '300')

**APPLICATIONS**

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



Parameter	Symbol	Device	Value	Units
<b>TOTAL DEVICE</b>				
Storage Temperature	$T_{STG}$	All	-55 to +150	°C
Operating Temperature	$T_{OPR}$	All	-55 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	350	mW
			4.6	mW/°C
<b>EMITTER</b>				
Continuous Forward Current	$I_F$	All	100	mA
Forward Current - Peak (1 $\mu$ s pulse, 300 pps)	$I_F(pk)$	All	$\pm 1.0$	A
LED Power Dissipation Derate Linearly From 25°C	$P_D$	All	200	mW
			2.6	mW/°C
<b>DETECTOR</b>				
Detector Power Dissipation Derate above 25°C	$P_D$	All	300	mW
			4.0	mW/°C

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

**INDIVIDUAL COMPONENT CHARACTERISTICS**

Parameter	Test Conditions	Symbol	Device	Min	Typ	Max	Unit
<b>EMITTER</b>							
Input Forward Voltage	$I_F = \pm 10\text{ mA}$	$V_F$	All		1.2	1.5	V
Capacitance	$V_F = 0\text{ V}, f = 1.0\text{ MHz}$	$C_J$	All		80		pF
<b>DETECTOR</b>							
Breakdown Voltage Collector to Emitter	$I_C = 1.0\text{ mA}, I_F = 0$	$BV_{CEO}$	All	30			V
Collector to Base	$I_C = 100\text{ }\mu\text{A}, I_F = 0$	$BV_{CBO}$	All	70			V
Emitter to Base	$I_E = 100\text{ }\mu\text{A}, I_F = 0$	$BV_{EBO}$	All	5			V
Emitter to Collector	$I_E = 100\text{ }\mu\text{A}, I_F = 0$	$BV_{ECO}$	All	7			V
Leakage Current Collector to Emitter	$V_{CE} = 10\text{ V}, I_F = 0$	$I_{CEO}$	H11AA1,3,4 H11AA2			50 200	nA
Capacitance Collector to Emitter	$V_{CE} = 0, f = 1\text{ MHz}$	$C_{CE}$	All		10		pF
Collector to Base	$V_{CE} = 0, f = 1\text{ MHz}$	$C_{CB}$	All		80		pF
Emitter to Base	$V_{CE} = 0, f = 1\text{ MHz}$	$C_{EB}$	All		15		pF

**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	100			%
			H11AA3	50			
			H11AA1	20			
			H11AA2	10			
Current Transfer Ratio, Symmetry	$I_F = \pm 10\text{ mA}, V_{CE} = 10\text{ V}$ (Figure.8)		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	$f = 60\text{ Hz}, t = 1\text{ min.}$	$V_{ISO}$	5300			V
Isolation Resistance	$V_{I-O} = 500\text{ VDC}$	$R_{ISO}$	$10^{11}$			$\Omega$

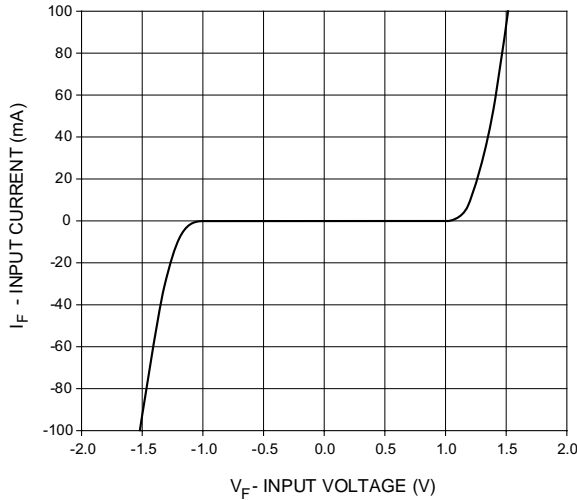
**H11AA1**

**H11AA3**

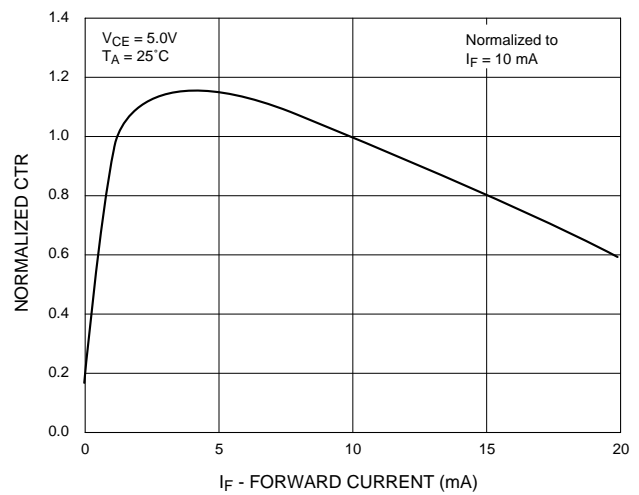
**H11AA2**

**H11AA4**

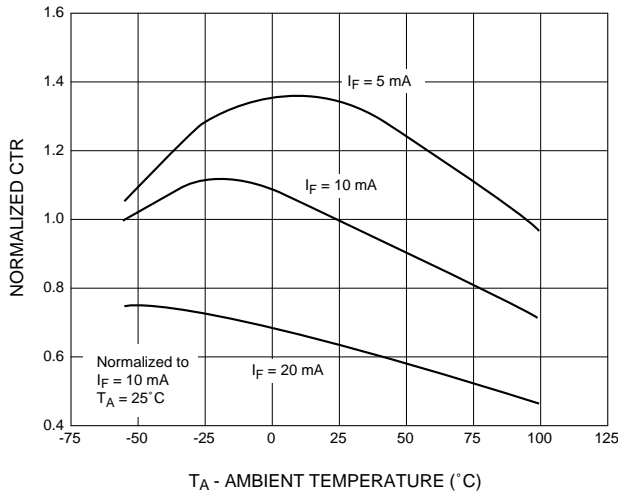
**Fig. 1 Input Voltage vs. Input Current**



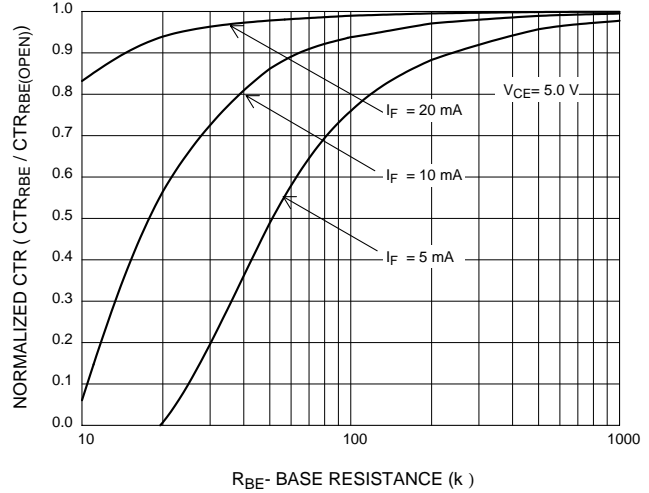
**Fig. 2 Normalized CTR vs. Forward Current**



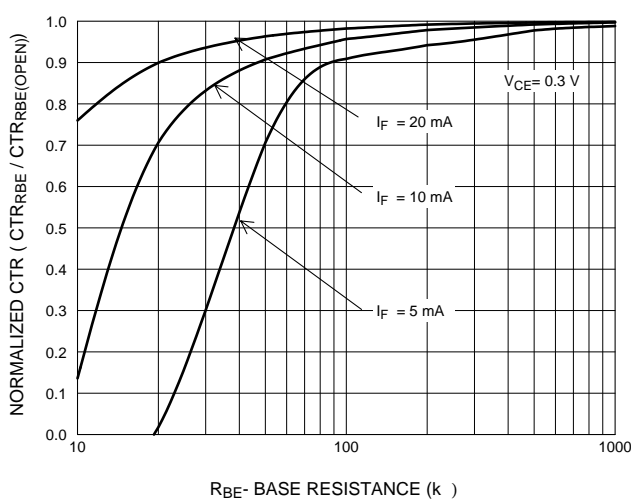
**Fig. 3 Normalized CTR vs. Ambient Temperature**



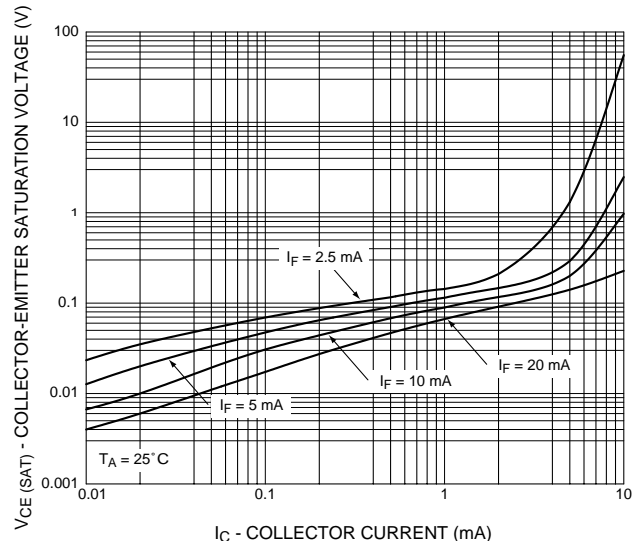
**Fig. 4 CTR vs. R<sub>BE</sub> (Unsaturated)**



**Fig. 5 CTR vs. R<sub>BE</sub> (Saturated)**



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



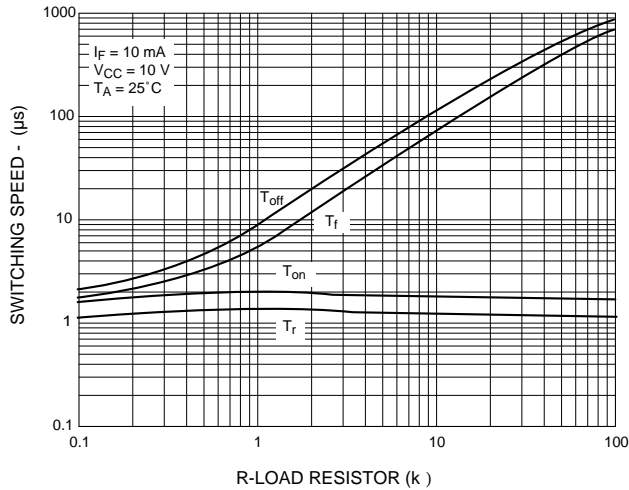
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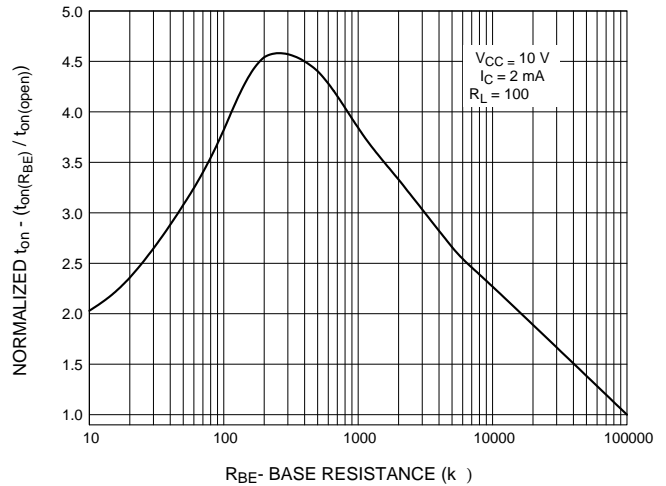
H11AA2

H11AA4

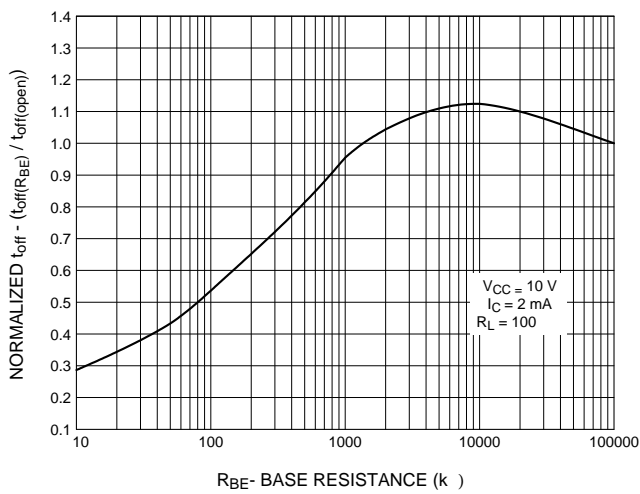
**Fig. 7 Switching Speed vs. Load Resistor**



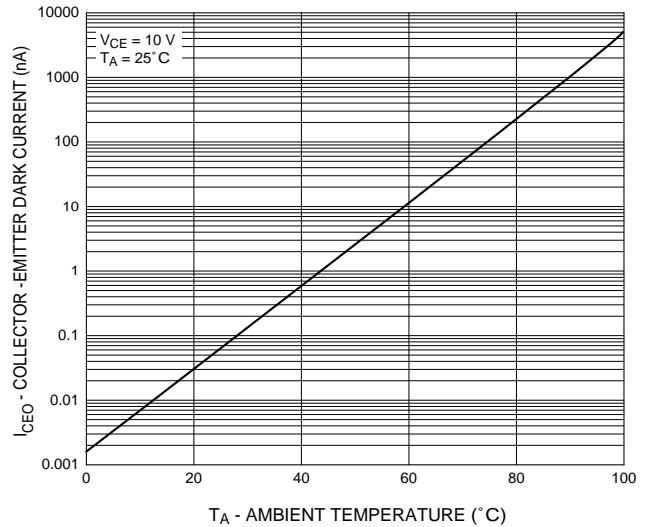
**Fig. 8 Normalized  $t_{on}$  vs.  $R_{BE}$**



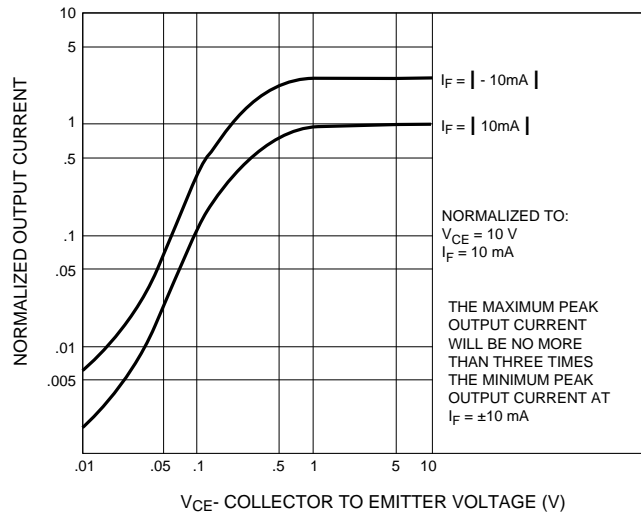
**Fig. 9 Normalized  $t_{off}$  vs.  $R_{BE}$**



**Fig. 10 Dark Current vs. Ambient Temperature**



**Fig. 11 Output Symmetry Characteristics**



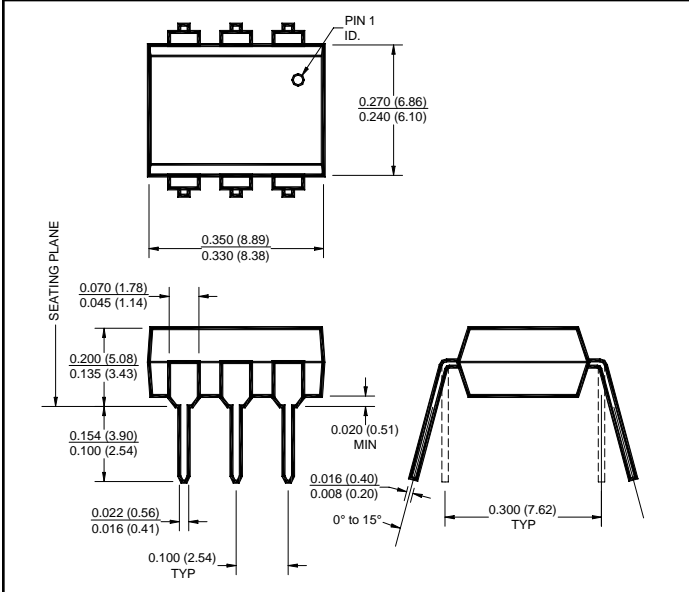
H11AA1

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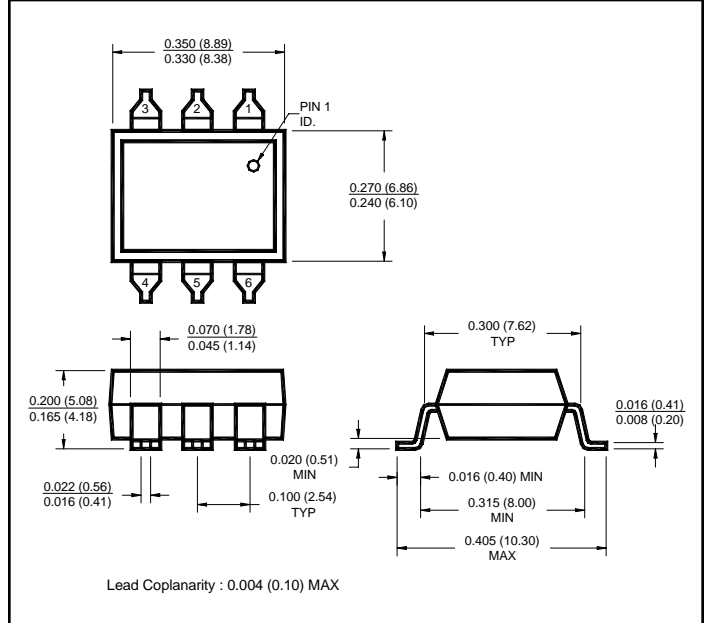
H11AA2

H11AA4

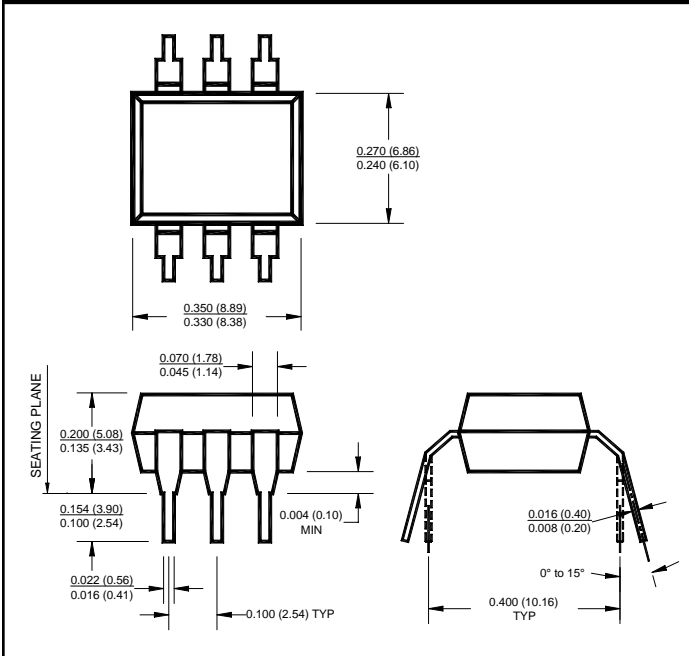
**Package Dimensions (Through Hole)**



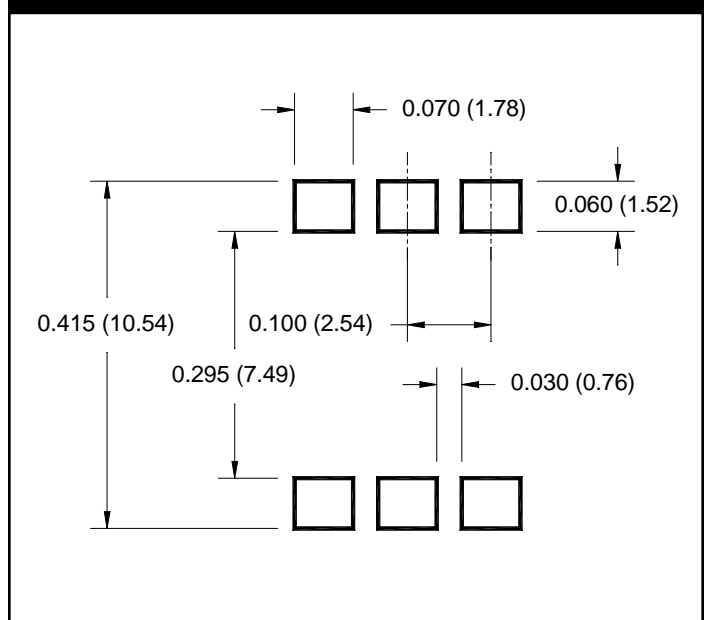
**Package Dimensions (Surface Mount)**



**Package Dimensions (0.4" Lead Spacing)**



**Recommended Pad Layout for  
Surface Mount Leadform**



**NOTE**

All dimensions are in inches (millimeters)

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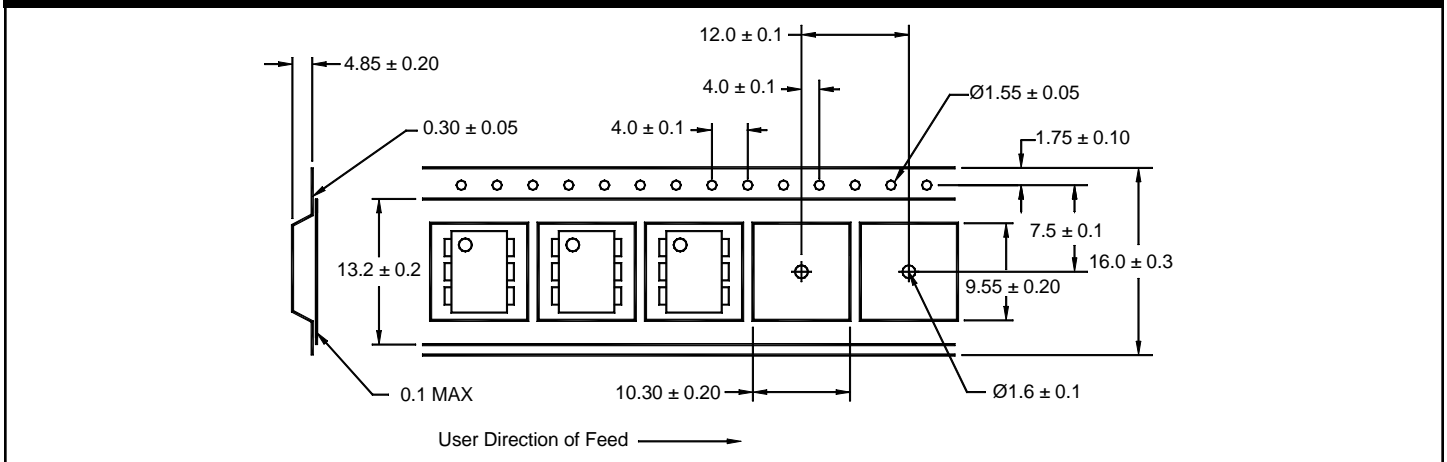
H11AA2

H11AA4

**ORDERING INFORMATION**

Option	Order Entry Identifier	Description
S	.S	Surface Mount Lead Bend
SD	.SD	Surface Mount; Tape and Reel
W	.W	0.4" Lead Spacing
300	.300	VDE 0884
300W	.300W	VDE 0884, 0.4" Lead Spacing
3S	.3S	VDE 0884, Surface Mount
3SD	.3SD	VDE 0884, Surface Mount, Tape and Reel

**Carrier Tape Specifications ("D" Taping Orientation)**



**NOTE**

All dimensions are millimeters

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