

6-Pin DIP AC Input Phototransistor Optocouplers

H11AA1M, H11AA4M

Description

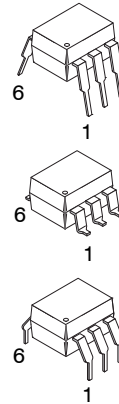
The H11AA1M and H11AA4M devices consist of two gallium-arsenide infrared emitting diodes connected in inverse parallel driving a single silicon phototransistor output.

Features

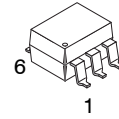
- Bi-polar Emitter Input
- Built-in Reverse Polarity Input Protection
- Safety and Regulatory Approvals:
 - ♦ UL1577, 4,170 VAC_{RMS} for 1 Minute
 - ♦ DIN-EN/IEC60747-5-5, 850 V Peak Working Insulation Voltage

Applications

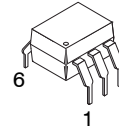
- AC Line Monitor
- Unknown Polarity DC Sensor
- Telephone Line Interface



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CASE 646BX

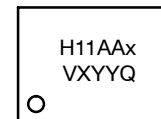


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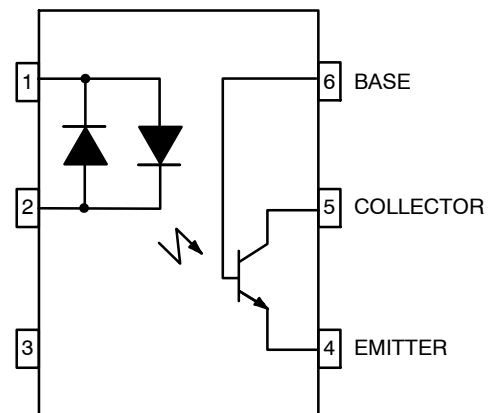
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MARKING DIAGRAM



H11AAx = Device Number (x = 1 or 4)
V = DIN EN/IEC60747-5-5 Option (only appears on component ordered with this option)
X = One-Digit Year Code, e.g., '5'
YY = Digit Work Week, Ranging from '01' to '53'
Q = Assembly Package Code

SCHEMATIC



ORDERING INFORMATION

See detailed ordering and shipping information on page 6 of this data sheet.

H11AA1M, H11AA4M

SAFETY AND INSULATION RATINGS (As per DIN EN/IEC 60747-5-5, this optocoupler is suitable for “safe electrical insulation” only within the safety limit data. Compliance with the safety ratings shall be ensured by means of protective circuits.)

Parameter		Characteristics
Installation Classifications per DIN VDE 0110/1.89 Table 1, For Rated Mains Voltage	<150 V _{RMS}	I–IV
	<300 V _{RMS}	I–IV
Climatic Classification		55/100/21
Pollution Degree (DIN VDE 0110/1.89)		2
Comparative Tracking Index		175

Symbol	Parameter	Value	Unit
V _{PR}	Input-to-Output Test Voltage, Method A, V _{IORM} × 1.6 = V _{PR} , Type and Sample Test with t _m = 10 s, Partial Discharge < 5 pC	1360	V _{peak}
	Input-to-Output Test Voltage, Method B, V _{IORM} × 1.875 = V _{PR} , 100% Production Test with t _m = 1 s, Partial Discharge < 5 pC	1594	V _{peak}
V _{IORM}	Maximum Working Insulation Voltage	850	V _{peak}
V _{IOTM}	Highest Allowable Over-Voltage	6000	V _{peak}
	External Creepage	≥7	mm
	External Clearance	≥7	mm
	External Clearance (for Option TV, 0.4" Lead Spacing)	≥10	mm
DTI	Distance Through Insulation (Insulation Thickness)	≥0.5	mm
T _S	Case Temperature (Note 1)	175	°C
I _{S,INPUT}	Input Current (Note 1)	350	mA
P _{S,OUTPUT}	Output Power (Note 1)	800	mW
R _{IO}	Insulation Resistance at T _S , V _{IO} = 500 V (Note 1)	>10 ⁹	Ω

1. Safety limit values – maximum values allowed in the event of a failure.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
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TOTAL DEVICE

T _{STG}	Storage Temperature	-40 to +125	°C
T _{OPR}	Operating Temperature	-40 to +100	°C
T _J	Junction Temperature	-40 to +125	°C
T _{SOL}	Lead Solder Temperature	260 for 10 seconds	°C
P _D	Total Device Power Dissipation @ 25 °C	270	mW
	Derate Linearity from 25 °C	2.94	mW/°C

EMITTER

I _F	Continuous Forward Current	60	mA
I _{F(pk)}	Forward Current – Peak (1 μs Pulse, 300 pps)	±1.0	A
P _D	LED Power Dissipation @ 25 °C	120	mW
	Derate Linearity from 25 °C	1.41	mW/°C

DETECTOR

I _C	Continuous Collector Current	50	mA
P _D	Detector Power Dissipation @ 25 °C	150	mW
	Derate Linearity from 25 °C	1.76	mW/°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

H11AA1M, H11AA4M

ELECTRICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)

Symbol	Parameter	Test Conditions	Device	Min	Typ	Max	Unit
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INDIVIDUAL COMPONENT CHARACTERISTICS

EMITTER							
V _F	Input Forward Voltage	I _F = ±10 mA	-	1.17	1.50	-	V
C _J	Capacitance	V _F = 0 V, f = 1.0 MHz	-	80	-	-	pF
DETECTOR							
BV _{CEO}	Breakdown Voltage, Collector-to-Emitter	I _C = 1.0 mA, I _F = 0	30	100	-	-	V
BV _{CBO}	Breakdown Voltage, Collector-to-Base	I _C = 100 μA, I _F = 0	70	120	-	-	V
BV _{EBO}	Breakdown Voltage, Emitter-to-Base	I _E = 100 μA, I _F = 0	5	10	-	-	V
BV _{ECO}	Breakdown Voltage, Emitter-to-Collector	I _E = 100 μA, I _F = 0	7	10	-	-	V
I _{CEO}	Leakage Current, Collector-to-Emitter	V _{CE} = 10 V, I _F = 0	-	1	50	-	nA
C _{CE}	Capacitance Collector to Emitter	V _{CE} = 0, f = 1 MHz	-	10	-	-	pF
C _{CB}	Collector to Base	V _{CB} = 0, f = 1 MHz	-	80	-	-	pF
C _{EB}	Emitter to Base	V _{EB} = 0, f = 1 MHz	-	15	-	-	pF

TRANSFER CHARACTERISTICS

CTR _{CE}	Current Transfer Ratio, Collector-to-Emitter	I _F = ±10 mA, V _{CE} = 10 V	H11AA1M	20	-	-	%
			H11AA4M	100	-	-	%
	Current Transfer Ratio, Symmetry	I _F = ±10 mA, V _{CE} = 10 V (Figure 11)	All	0.33	-	3.00	
V _{CE(SAT)}	Saturation Voltage, Collector-to-Emitter	I _F = ±10 mA, I _{CE} = 0.5 mA	All	-	-	0.40	V

ISOLATION CHARACTERISTICS

V _{ISO}	Input-Output Isolation Voltage	t = 1 Minute	4170	-	-	-	VAC _{RMS}
C _{ISO}	Isolation Capacitance	V _{I-O} = 0 V, f = 1 MHz	-	0.7	-	-	pF
R _{ISO}	Isolation Resistance	V _{I-O} = ±500 VDC, T _A = 25°C	10 ¹¹	-	-	-	Ω

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

TYPICAL PERFORMANCE CHARACTERISTICS

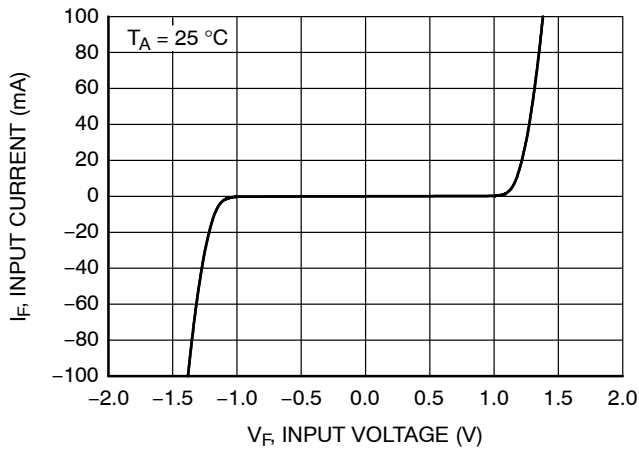


Figure 1. Input Voltage vs. Input Current

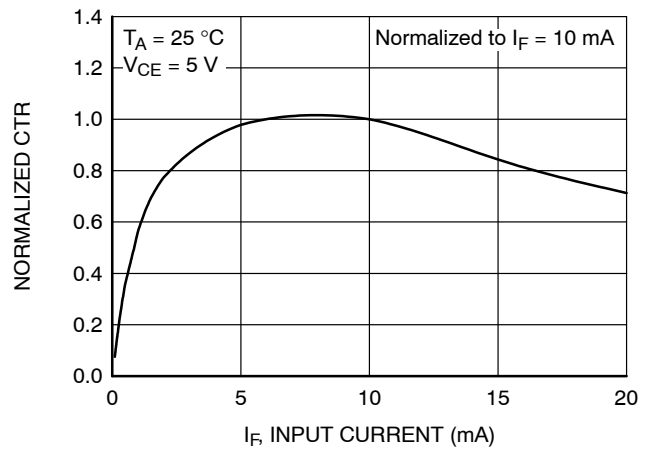


Figure 2. Normalized CTR vs. Forward Current

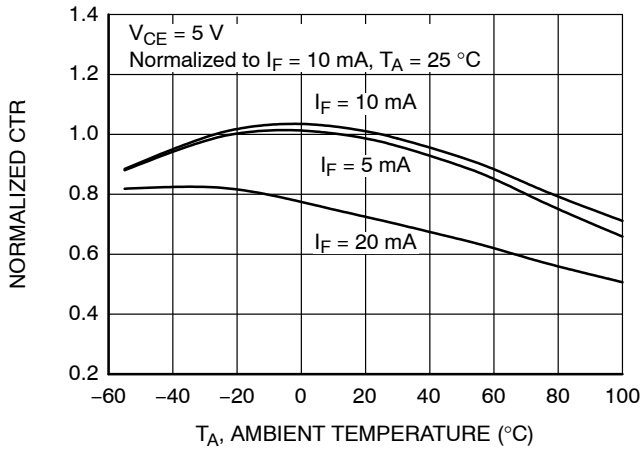


Figure 3. Normalized CTR vs. Ambient Temperature

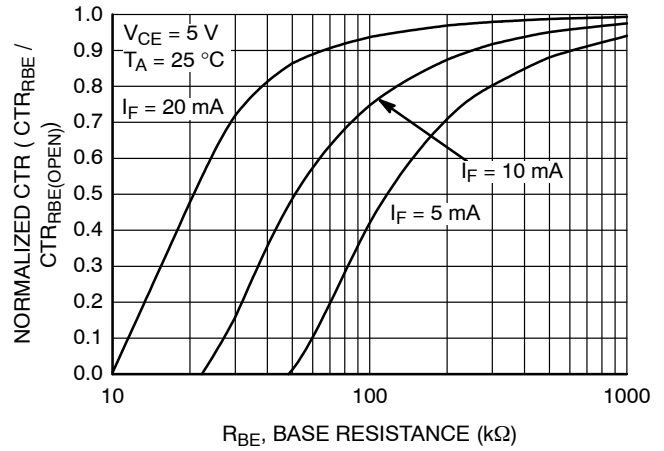


Figure 4. CTR vs. R_{BE} (Unsaturated)

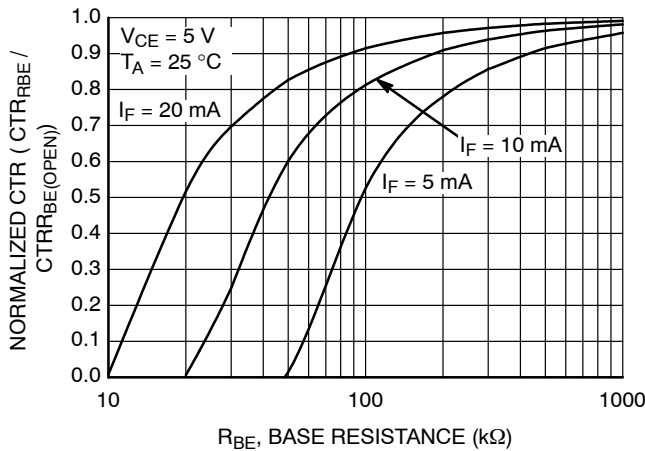


Figure 5. CTR vs. R_{BE} (Saturated)

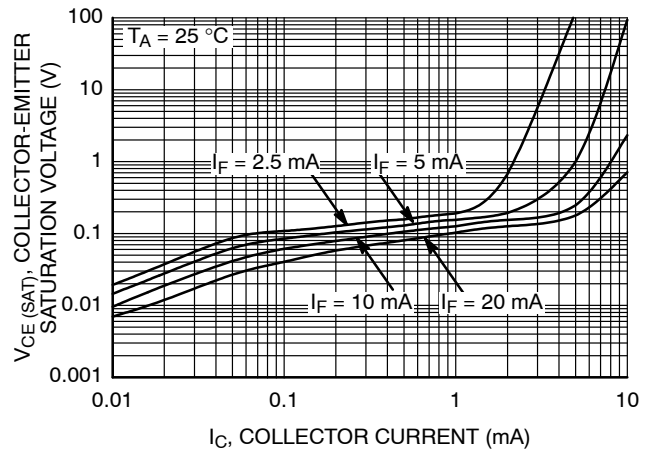


Figure 6. Collector-Emitter Saturation Voltage vs. Collector Current

H11AA1M, H11AA4M

TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

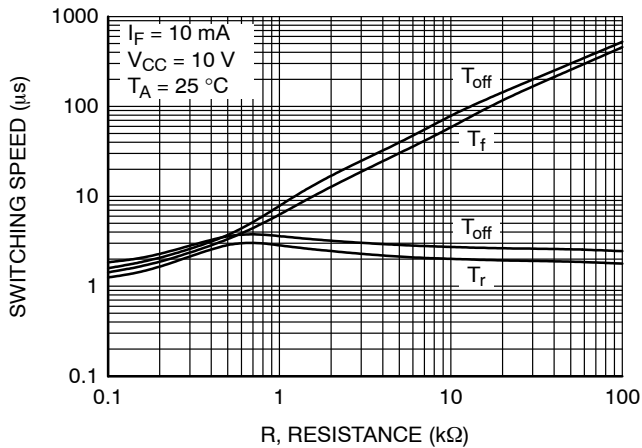


Figure 7. Switching Speed vs. Load Resistor

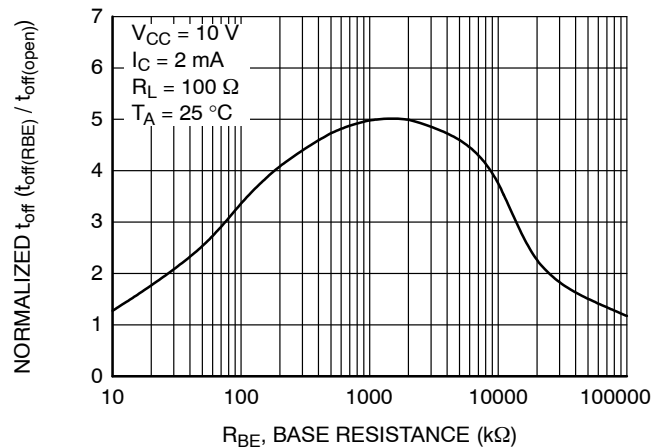


Figure 8. Normalized t_{on} vs. R_{BE}

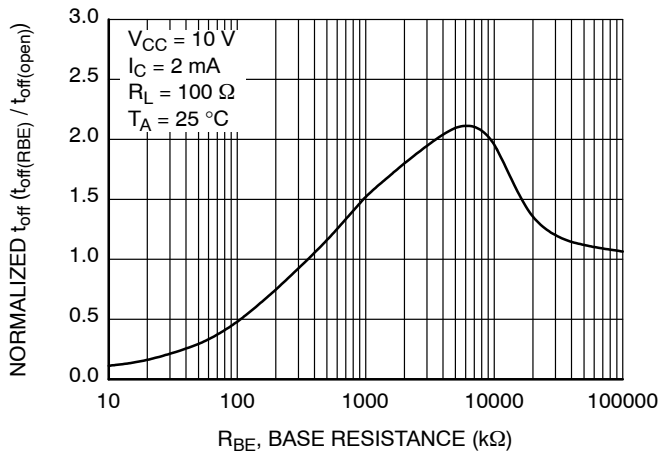


Figure 9. Normalized t_{off} vs. R_{BE}

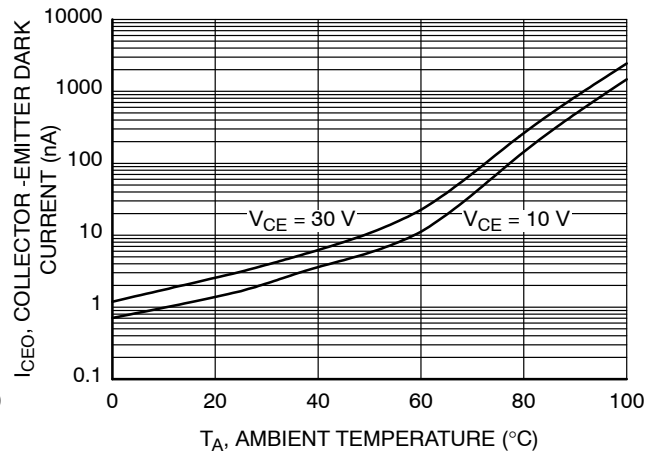


Figure 10. Dark Current vs. Ambient Temperature

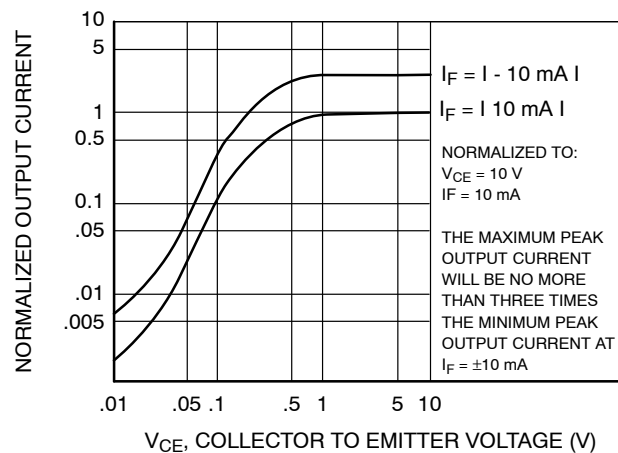


Figure 11. Output Symmetry Characteristics

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REFLOW PROFILE

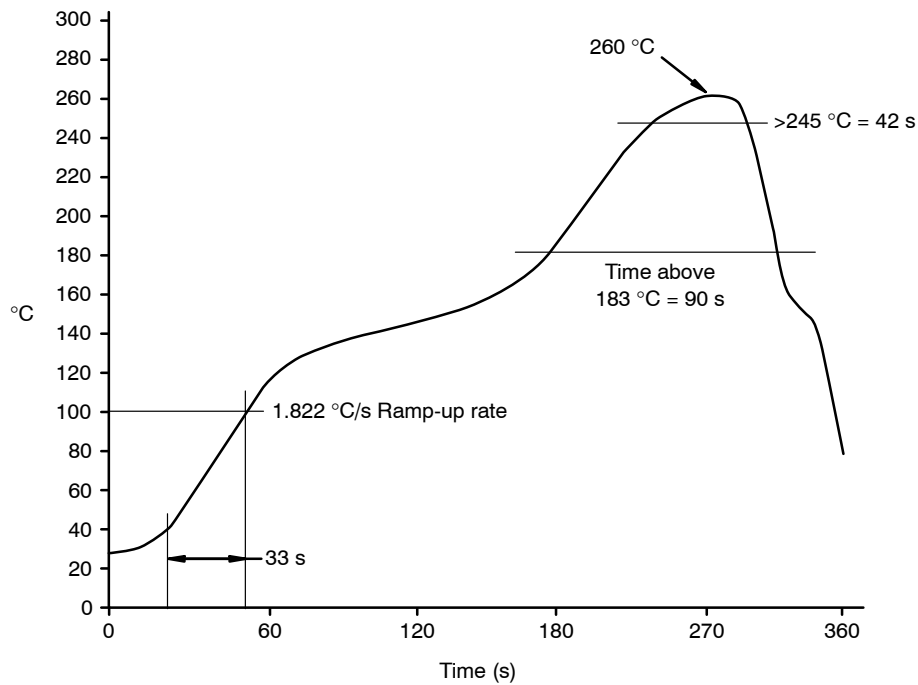


Figure 12. Reflow Profile

ORDERING INFORMATION (Note 2)

Part Number	Package	Shipping [†]
H11AA1M	DIP 6-Pin (Pb-Free)	1000 Units / Bulk Bag
H11AA1SM	SMT 6-Pin (Lead Bend) (Pb-Free)	1000 Units / Bulk Bag
H11AA1SR2M	SMT 6-Pin (Lead Bend) (Pb-Free)	1000 Units / Tape & Reel
H11AA1VM	DIP 6-Pin, DIN EN/IEC60747-5-5 Option (Pb-Free)	1000 Units / Bulk Bag
H11AA1SVM	SMT 6-Pin (Lead Bend), DIN EN/IEC60747-5-5 Option (Pb-Free)	1000 Units / Bulk Bag
H11AA1SR2VM	SMT 6-Pin (Lead Bend), DIN EN/IEC60747-5-5 Option (Pb-Free)	1000 Units / Tape & Reel
H11AA1TVM	DIP 6-Pin, 0.4" Lead Spacing, DIN EN/IEC60747-5-5 Option (Pb-Free)	1000 Units / Bulk Bag

[†] For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, [BRD8011/D](#).

2. The product orderable part number system listed in this table also applies to the H11AA4M device.

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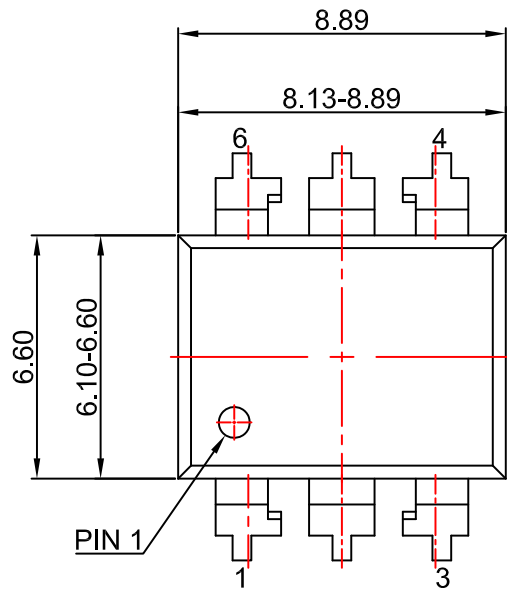
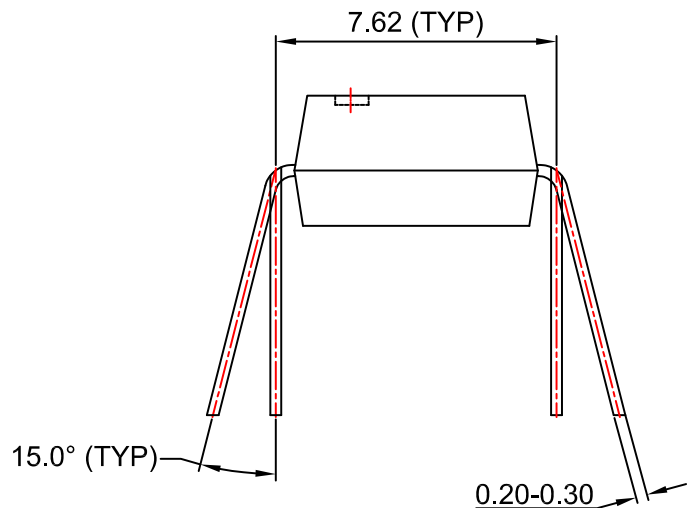
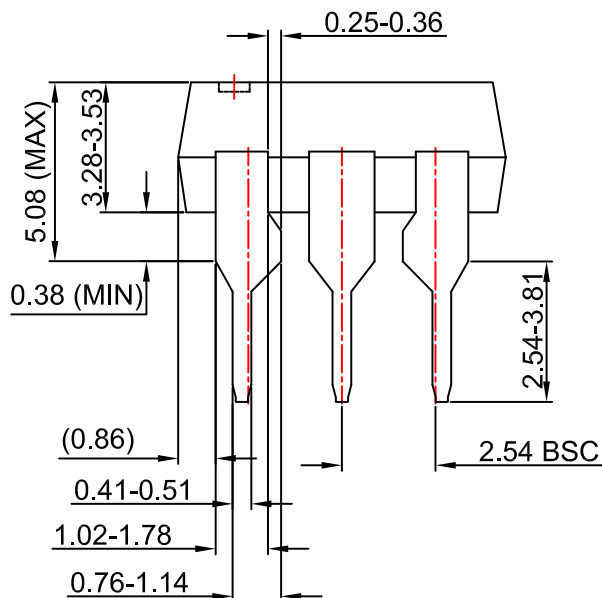
REVISION HISTORY

Revision	Description of Changes	Date
2	Initial Revision from Fairchild Semiconductor version.	9/4/2026



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NOTES:

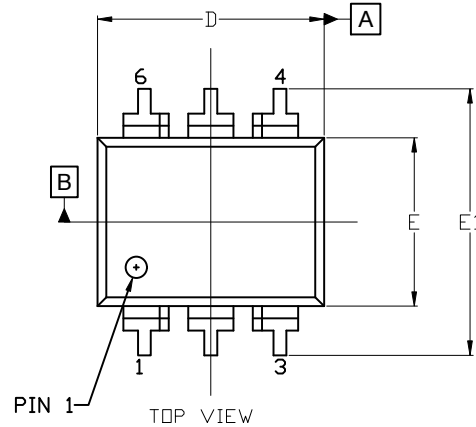
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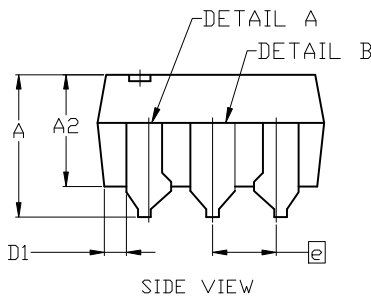
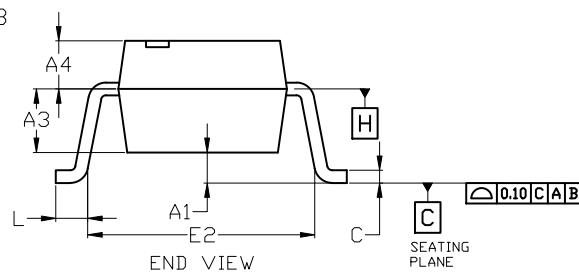
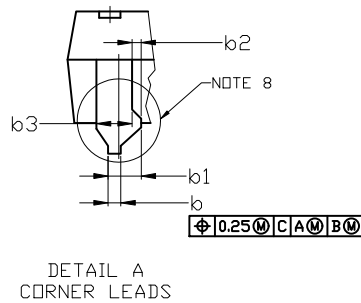
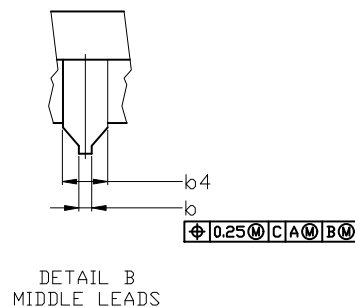
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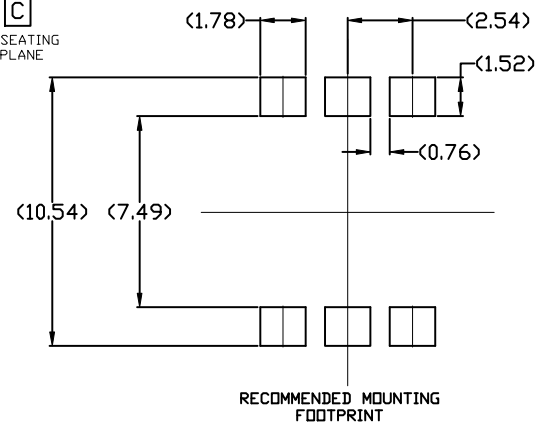
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NOTES:

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2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS A, A1, AND L ARE MEASURED WITH THE PACKAGE SEATED.
4. DIMENSIONS D, D1, AND E1 DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS. MOLD FLASH OR PROTRUSIONS ARE NOT TO EXCEED 2.54mm.
5. PACKAGE CONTOUR IS OPTIONAL (ROUNDED OR SQUARE CORNERS).
6. CENTER LINE OF CORNER LEADS ARE LOCATED BY LOCATING THE CENTER OF FEATURE b2 AND b3.



DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	---	---	4.80
A1	0.38	---	---
A2	3.28	3.40	3.53
A3	2.49 REF		
A4	1.89 REF		
b	0.41	0.46	0.51
b1	0.76	0.92	1.14
b2	0.25	0.28	0.36
b3	1.02	1.40	1.78
b4	1.778 REF		
c	0.20	0.25	0.30
D	8.13	8.51	8.89
D1	0.86 REF		
E	6.10	6.35	6.60
E1	8.43	9.17	9.90
E2	8.13 REF		
e	2.54 BSC		
L	0.16	0.52	0.88



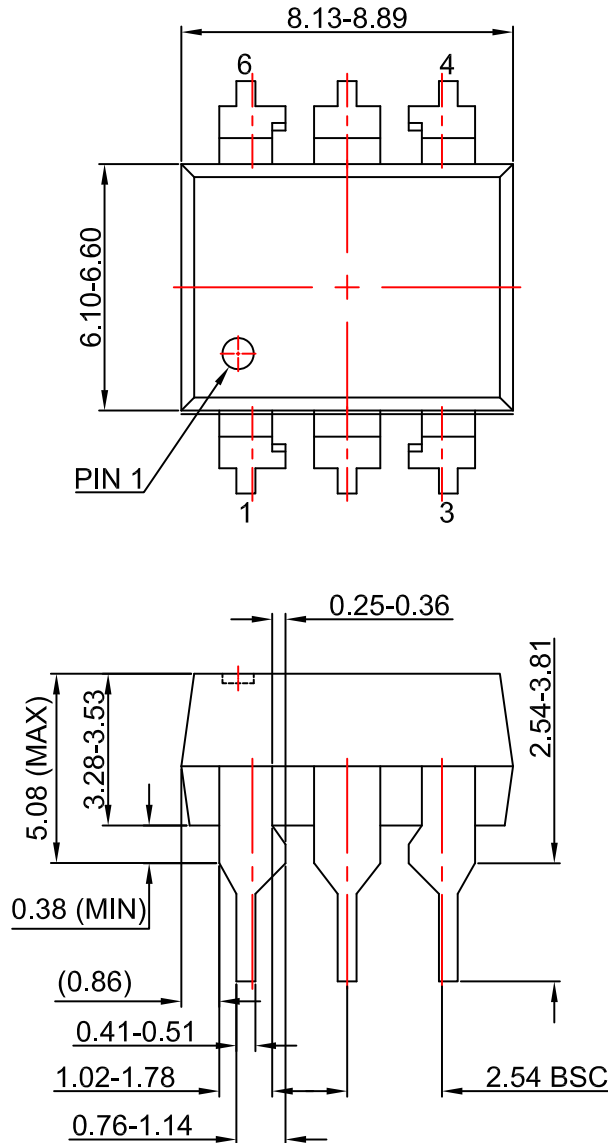
- For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERM/D.

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