



DESCRIPTION

The AO311 operates from a single supply voltage of 5V to 30V or dual supplies of up to $\pm 15V$, making it a truly general-purpose voltage comparator. Like other standard comparators, the AO311 offers flexible input and output configurations.

The input stage can be isolated from the system ground, while the output can be referenced to ground, the positive supply, or the negative supply (VEE). This flexibility allows the AO311 to interface with DTL, RTL, TTL, and MOS logic families.

The open-collector output can sink up to 50mA and can switch output voltages up to 40V, making it suitable for driving relays, lamps, solenoids, and other high-voltage or high-current loads.

The AO311 is available in SOP8 and DIP8 packages.

FEATURES

- Maximum Input Bias Current: 300 nA
- Maximum Offset Current: 70 nA
- Differential input voltage range: $\pm 30V$
- Can Operate from Single 5-V Supply
- Strobe Capability
- Strobe On current: 3.0 mA

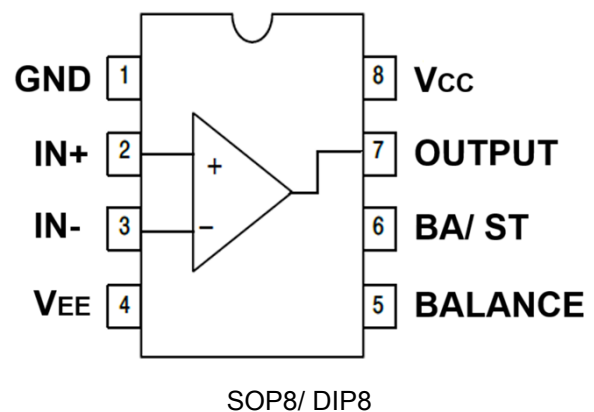
APPLICATION

- Desktop PCs
- Body Control Modules
- White Goods
- Building Automation
- Oscillators
- Peak Detectors

TYPICAL APPLICATION

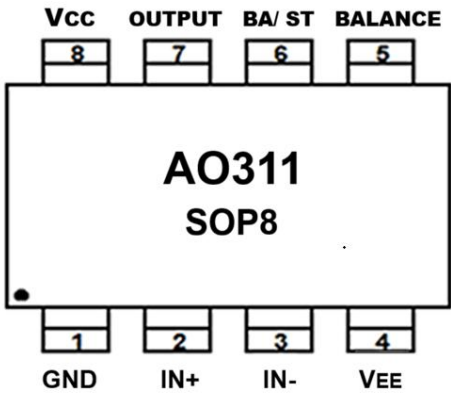
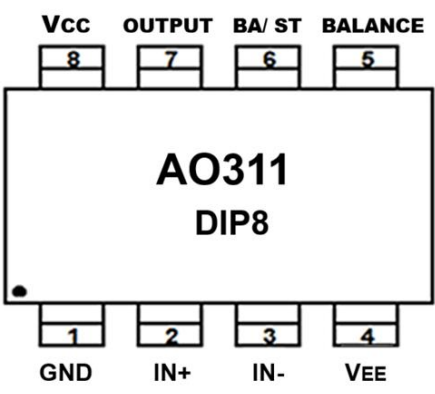
ORDERING INFORMATION

Package Type		Part Number	
SOP8 SPQ: 3,000pcs/Reel	E5	AO311M8R	
		AO311M8VR	
DIP8 SPQ: 4,000pcs/Reel	P8	AO311P8R	
		AO311P8VR	
Note	V: Halogen free Package R: Tape & Reel		
AiT provides all RoHS products			





PIN DESCRIPTION

 AO311 SOP8 SOP8, M8 Top View		 AO311 DIP8 DIP8, P8 Top View	
PIN#		Symbol	Function
SOP8	DIP8		
1	1	GND	GND
2	2	IN+	Noninverting comparator
3	3	IN-	Inverting input comparator
4	4	V _{EE}	Negative supply
5	5	BALANCE	Balance
6	6	BA/ST	Strobe
7	7	OUTPUT	Output collector comparator
8	8	V _{CC}	Positive supply

**ABSOLUTE MAXIMUM RATINGS**

V _{CC} , Total Supply Voltage V _{CC} + V _{EE}		36V
Output to Negative Supply Voltage		40V
Ground to Negative Supply Voltage		30V
Input Differential Voltage		±30V
Input Voltage (Note 2)		±15V
Voltage at Strobe Pin		V _{CC} to V _{CC} -5
R _{θJA} , Power Dissipation and Thermal Characteristics	DIP P _D	625mW
	R _{θJA} ,	5m°C/W
T _A , Operating Range		0°C ~ +70°C
T _{STG} , Storage Temperature		-65°C ~ +150°C
T _J , Junction Temperature ⁽⁵⁾		+150°C

*Stresses above these ratings may cause permanent damage. Exposure to absolute maximum conditions for extended periods may degrade device reliability. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those specified is not implied.



ELECTRICAL CHARACTERISTICS

At $T_A = +25^\circ\text{C}$, $V_S = 5\text{V}$, $R_L = 10\text{k}\Omega$ connected to $V_S/2$, and $V_{OUT} = V_S/2$, unless otherwise noted.

Parameter	Symbol	Conditions	Min	Typ.	Max	Unit
Input Offset Voltage	V_{IO}	$R_S \leq 50\text{k}\Omega$, $T_A = +25^\circ\text{C}$	-	2.0	7.5	mV
		$R_S \leq 50\text{k}\Omega$, $T_{low} \leq T_A \leq T_{high}$			10.0	
Input Offset Current (Note 3)	I_{IO}	$T_A = +25^\circ\text{C}$		1.7	50	nA
		$T_{low} \leq T_A \leq T_{high}$			70	
Input Bias Current	I_{IB}	$T_A = +25^\circ\text{C}$	-	45	250	nA
		$T_{low} \leq T_A \leq T_{high}$	-		300	
Voltage Gain	A_V		40	200	-	V/mV
Response Time			-	200	-	ns
Saturation Voltage	V_{OL}	$V_{ID} \leq -5.0\text{mV}$, $I_O = 50\text{mA}$, $T_A = 25^\circ\text{C}$	-	0.75	1.5	V
		$V_{CC} \geq 4.5\text{V}$, $V_{EE} = 0$, $T_{low} \leq T_A \leq T_{high}$				
		$V_{ID} \leq 10\text{mV}$, $I_{sink} \leq 8.0\text{mA}$	-	0.23	0.4	
Strobe "On" Current	I_S		-	30	-	mA
Output Leakage Current		$V_{ID} \geq 10\text{mV}$, $V_O = 35\text{V}$, $T_A = 25^\circ\text{C}$, $I_{strobe} = 3.0\text{mA}$	-	0.2	50	nA
Input Voltage Range	V_{ICR}	$T_{low} \leq T_A \leq T_{high}^*$	-14.5	--	+13.0	V
Positive Supply Current	I_{CC}		-	+2.4	+7.5	mA
Negative Supply Current	I_{EE}		-	-1.3	-5.0	us

Note: AO311: $T_{low} = 0^\circ\text{C}$, $T_{high} = +70^\circ\text{C}$

- Offset voltage, offset current, and input bias current specifications apply over a supply voltage range from a single 5.0 V supply to dual $\pm 15\text{V}$ supplies.
- This specification applies to $\pm 15\text{V}$ supply operation. The maximum positive input voltage is 30 V above the negative supply, and the minimum negative input voltage is the negative supply voltage or 30 V below the positive supply, whichever is lower.
- The specified offset voltage and offset current are the maximum values required to drive the output to within 1 V of either supply rail with a 1.0 mA load. These parameters define the overall error band and account for the worst-case effects of voltage gain and input impedance.
- The specified response time is measured with a 100mV input step and 5.0 mV of overdrive.
- Do not short the STROBE pin to ground. The STROBE pin should be current driven with 3.0 mA to 5.0 mA, rather than connected directly to ground.



TYPICAL PERFORMANCE CHARACTERISTICS

Fig 1. Input Bias Current
vs Input Differential Voltage

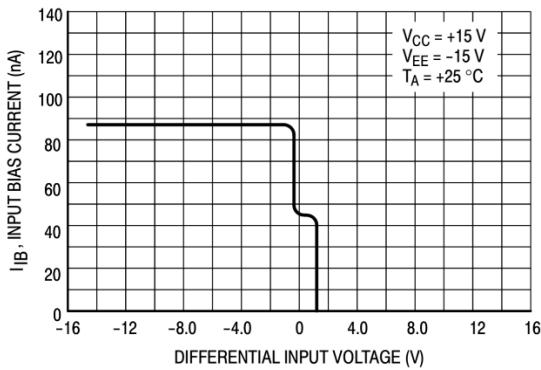


Fig 2. Common Mode vs Temperature

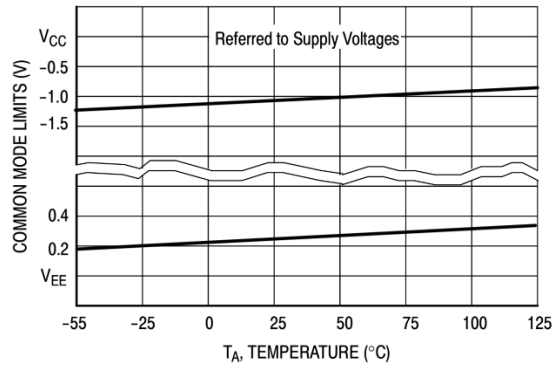


Fig 3. Output Short Circuit Current
Characteristics and Power Dissipation

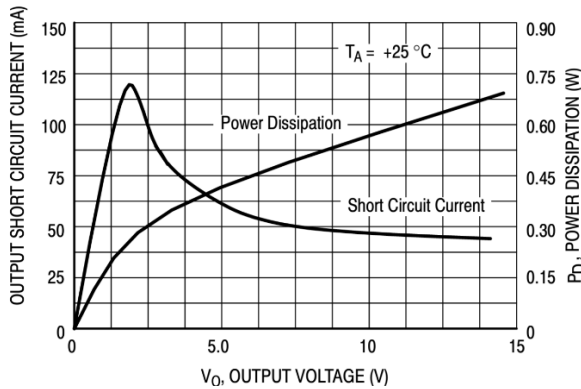


Fig 4. Output Saturation Voltage vs
Output Current

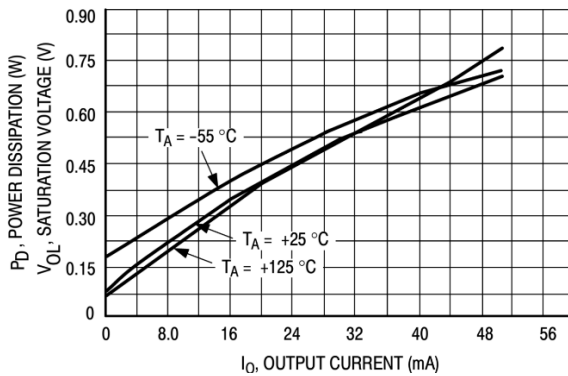


Fig 5. Power-Supply Rejection Ratio vs.
Frequency

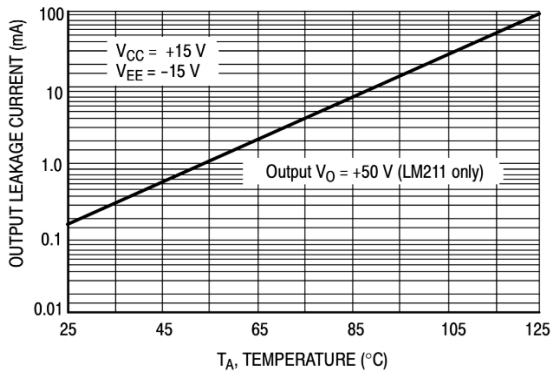


Fig 6. Common-Mode Rejection Ratio vs.
Frequency

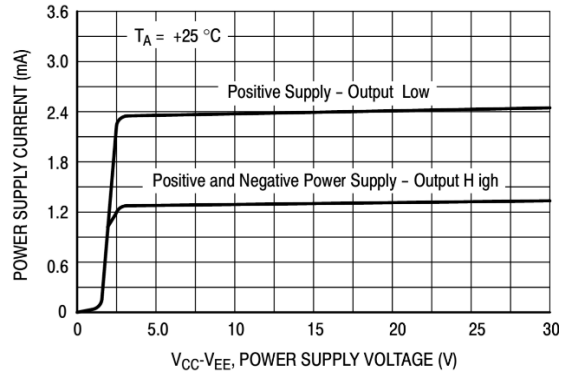




Fig 7. Input Bias Current vs Temperature

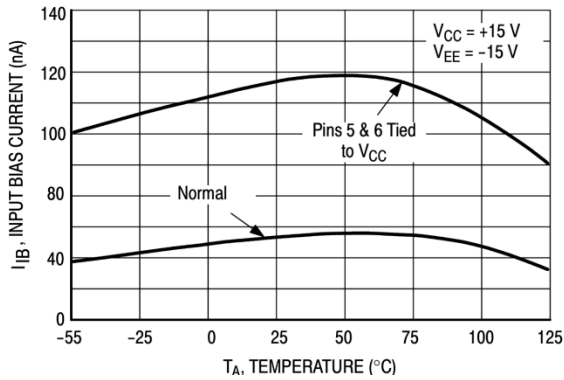


Fig 8. Input Offset Current vs Temperature

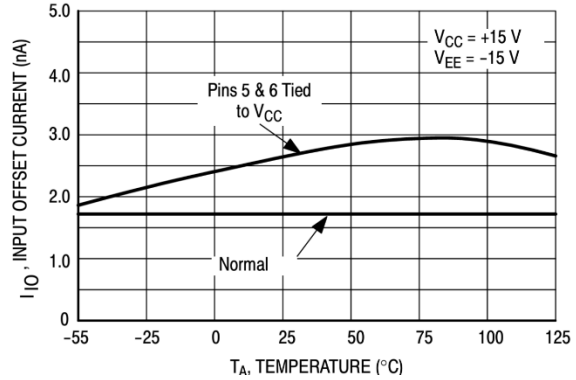
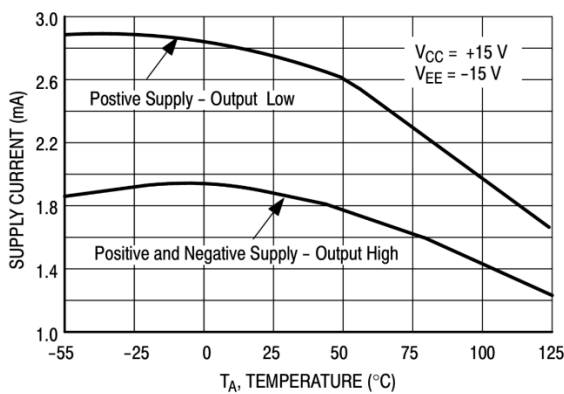
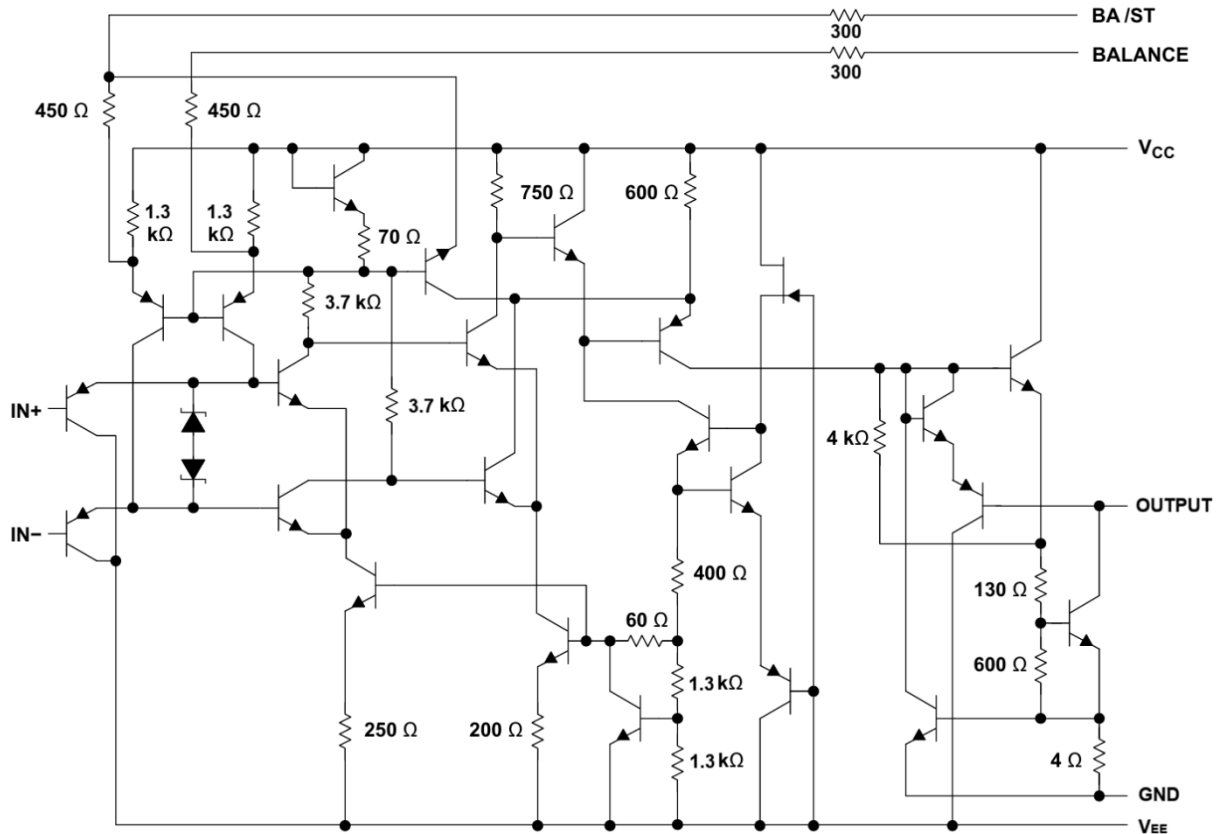


Fig 9. Power Supply Current vs Temperature



**BLOCK DIAGRAM****Fig 10. Circuit Function Schematic****APPLICATION INFORMATION****Feature Description**

AO311 features a PNP differential input stage that allows sensing input voltages close to V_{EE} . It also provides BALANCE and BA /ST pins for external offset adjustment or trimming. The input stage is followed by a high-gain amplification stage, enabling a fast response once a differential input voltage is detected. The output stage consists of an open-collector NPN transistor (low-side pull-down output).

Unlike most open-drain/open-collector comparators, the emitter of the AO311's output transistor is isolated from V_{EE} . This configuration allows the emitter to be connected to a user-defined reference, providing greater flexibility in setting the output low voltage (VOL) and interfacing with different logic levels



Typical Design Application Schematic

Fig11. Ground-Referred Load

Input polarity is reversed when GND pin is used as an output.

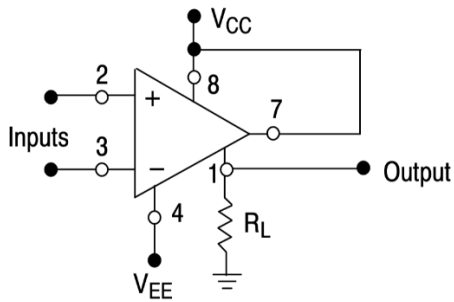


Fig12. Load Referred to Negative Supply

Input polarity is reversed when GND pin is used as an output.

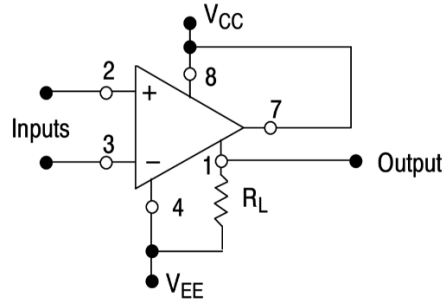


Fig13. Single Supply

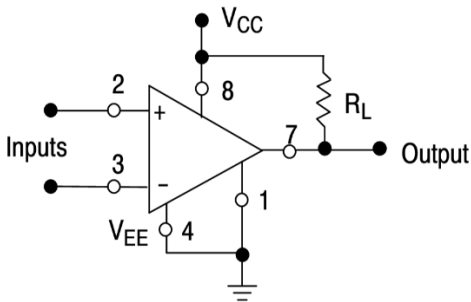


Fig14. Split Power Supply with Offset Balance

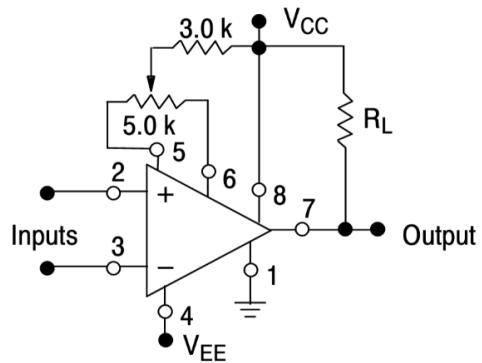


Fig15. Load Referred to Positive Supply

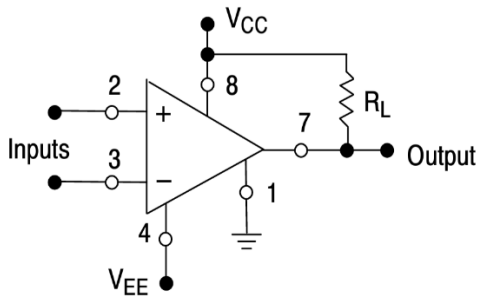
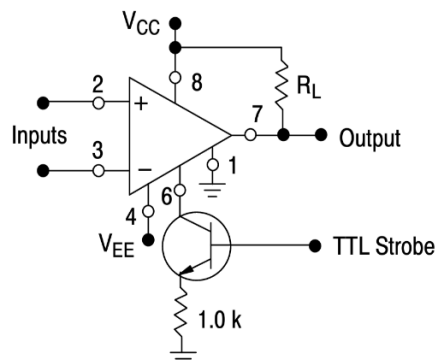


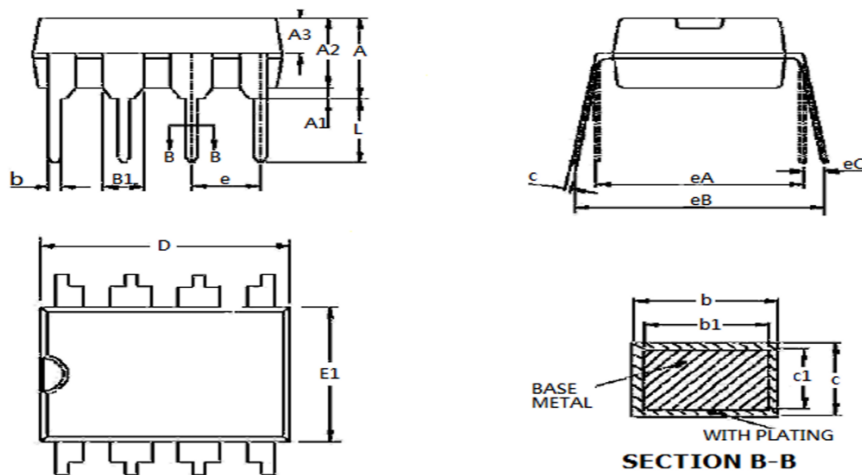
Fig16. Strobe Capability





PACKAGE INFORMATION

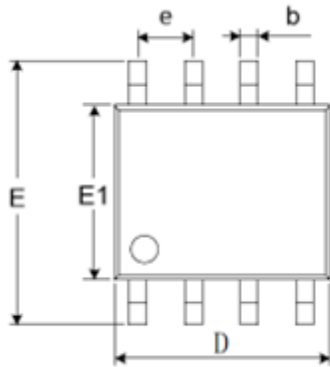
Dimension in DIP8 (Unit: mm)



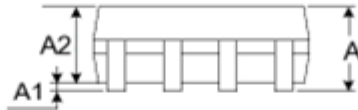
Symbol	Millimeters	
	Min	Max
A	3.60	4.00
A1	0.51	-
A2	3.00	3.40
A3	1.55	1.65
b	0.44	0.53
b1	0.43	0.48
B1	1.52 BSC	
c	0.24	0.32
c1	0.23	0.27
D	9.05	9.45
E1	6.15	6.55
e	2.54 BSC	
eA	7.62 BSC	
eB	7.62	9.30
eC	0.00	0.84
L	3.00	-



Dimension in SOP8 (Unit: mm)



TOP VIEW

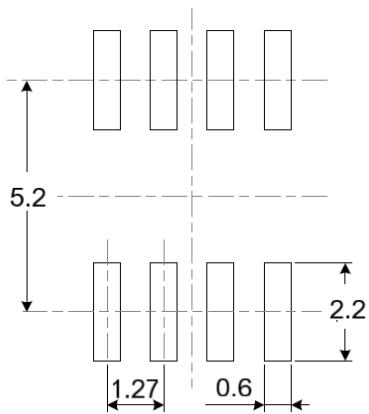


BOTTOM VIEW



SIDE VIEW

Recommended Land Pattern



Symbol	Millimeters	
	Min	Max
A	1.350	1.750
A1	0.100	0.250
A2	1.350	1.550
b	0.330	0.510
c	0.170	0.250
D	4.800	5.000
e	1.270 BSC	
E	5.800	6.200
E1	3.800	4.000
L	0.400	1.270
θ	0°	8°



IMPORTANT NOTICE

AiT Semiconductor Inc. (AiT) reserves the right to make changes to any its product, specifications, to discontinue any integrated circuit product or service without notice, and advises its customers to obtain the latest version of relevant information to verify, before placing orders, that the information being relied on is current.

AiT Semiconductor Inc.'s integrated circuit products are not designed, intended, authorized, or warranted to be suitable for use in life support applications, devices or systems or other critical applications. Use of AiT products in such applications is understood to be fully at the risk of the customer. As used herein may involve potential risks of death, personal injury, or servere property, or environmental damage. In order to minimize risks associated with the customer's applications, the customer should provide adequate design and operating safeguards.

AiT Semiconductor Inc. assumes to no liability to customer product design or application support. AiT warrants the performance of its products of the specifications applicable at the time of sale.