

**1.5A ULTRA LOW DROPOUT LINEAR REGULATOR****AZ39151****General Description**

The AZ39151 is a 1.5A, high accuracy linear voltage regulator. It features 375mV dropout voltage at 1.5A output current and low ground current over all operating conditions .

The AZ39151 is specifically designed for low voltage, high current output systems, such as PC add-in cards where their tiny dropout voltage and ground current values are important attributes.

The AZ39151 has fixed 3.3V, 5.0V versions and ADJ(1.25V) version.

The AZ39151 is available in TO-252-4 (PPAK) (for fixed versions) and TO-252-5 (for adjustable version) packages.

**Features**

- Minimum Guaranteed Output Current: 1.5A
- Low Dropout Voltage: 375mV at  $I_{OUT}=1.5A$
- Output Accuracy:  $\pm 1\%$
- Low Ground Current
- Internal Current and Thermal Limit
- Reversed-battery and Reversed-lead Insertion Protection
- Fast Transient Response
- TTL/CMOS Compatible Enable Pin

**Applications**

- Set-top Box
- Hi-end DVD Player/Recorder
- LCD TV/PDP
- LDO Linear Regulator for PC Add-in Cards
- High Efficiency Linear Power Supplies
- SMPS Post Regulator

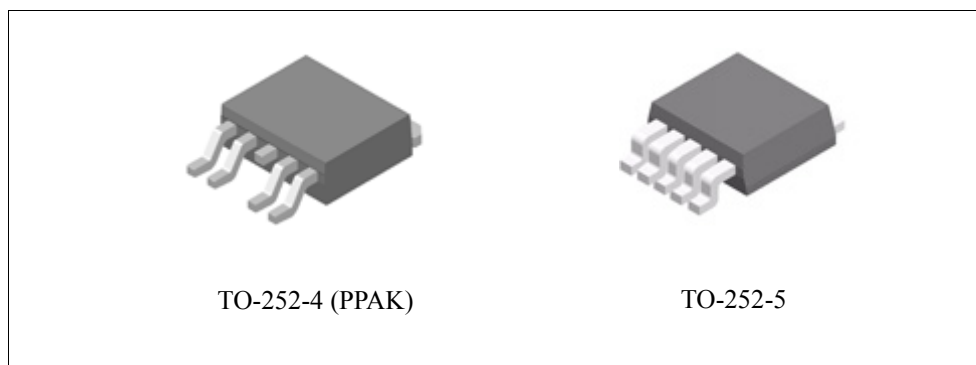


Figure 1. Package Types of AZ39151

**1.5A ULTRA LOW DROPOUT LINEAR REGULATOR** **AZ39151**

**Pin Configuration**

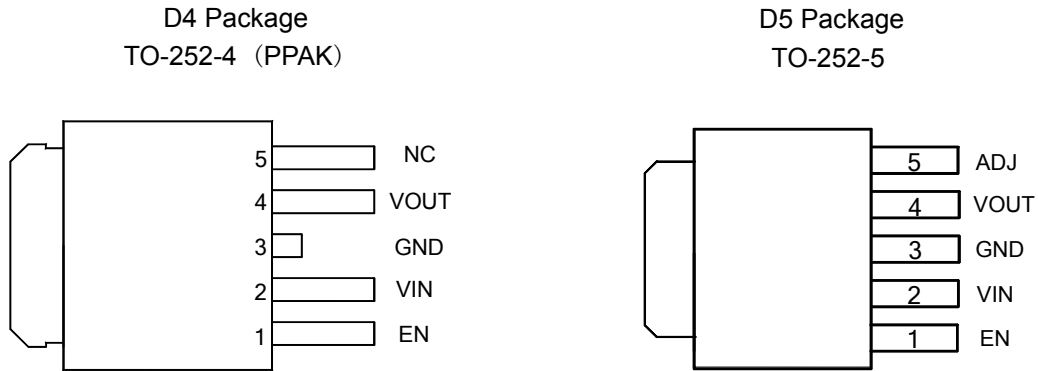


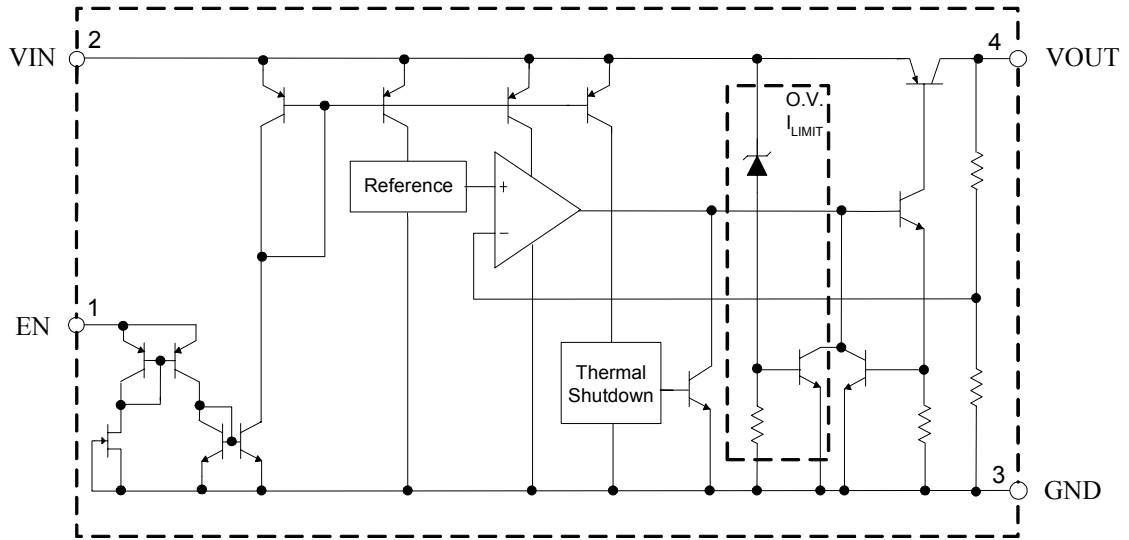
Figure 2. Pin Configuration of AZ39151 (Top View)

**Pin Description**

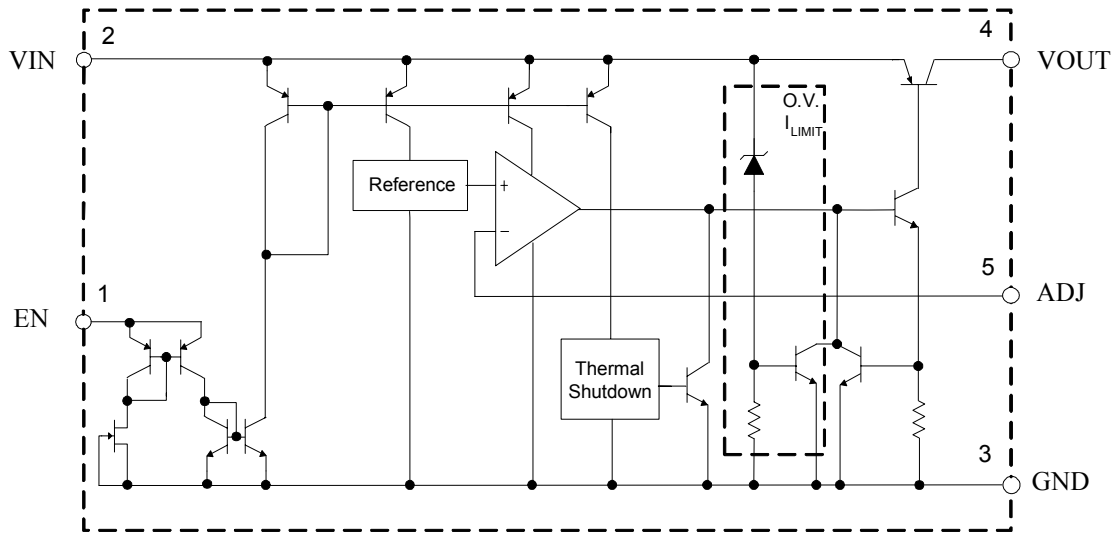
Pin Number	Pin Name	Function
1	EN	Enable: TTL/CMOS compatible input. Logic high=enable; Logic low or open=shutdown
2	VIN	Unregulated input
3	GND	Ground pin. This pin and TAB are internally connected
4	VOUT	Regulated output
5	ADJ/NC	Adjustable Output/No Connect

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**Functional Block Diagram**



Fixed Version



Adjustable Version

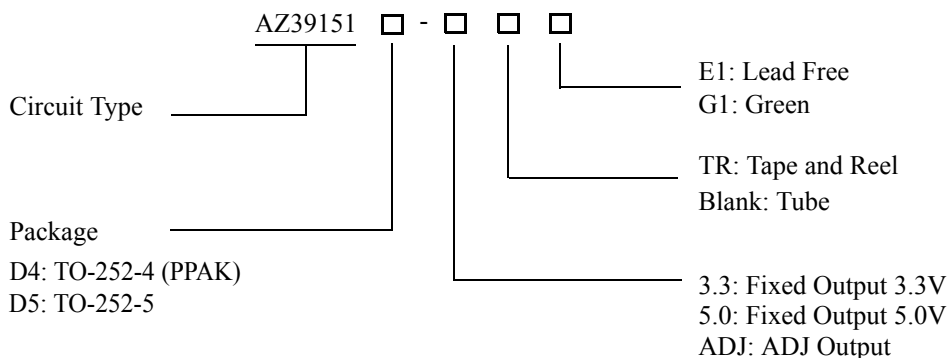
Figure 3. Functional Block Diagram of AZ39151



**1.5A ULTRA LOW DROPOUT LINEAR REGULATOR**

**AZ39151**

**Ordering Information**



Package	Temperature Range	Part Number		Marking ID		Packing Type
		Lead Free	Green	Lead Free	Green	
TO-252-4 (PPAK)	-40 to 125°C	AZ39151D4-3.3E1	AZ39151D4-3.3G1	AZ39151D4-3.3E1	AZ39151D4-3.3G1	Tube
		AZ39151D4-3.3TRE1	AZ39151D4-3.3TRG1	AZ39151D4-3.3E1	AZ39151D4-3.3G1	Tape & Reel
		AZ39151D4-5.0E1	AZ39151D4-5.0G1	AZ39151D4-5.0E1	AZ39151D4-5.0G1	Tube
		AZ39151D4-5.0TRE1	AZ39151D4-5.0TRG1	AZ39151D4-5.0E1	AZ39151D4-5.0G1	Tape & Reel
TO-252-5		AZ39151D5-ADJE1	AZ39151D5-ADJG1	AZ39151D5-ADJE1	AZ39151D5-ADJG1	Tube
		AZ39151D5-ADJTRE1	AZ39151D5-ADJTRG1	AZ39151D5-ADJE1	AZ39151D5-ADJG1	Tape & Reel

BCD Semiconductor's Pb-free products, as designated with "E1" suffix in the part number, are RoHS compliant. Products with "G1" suffix are available in green packages.

**1.5A ULTRA LOW DROPOUT LINEAR REGULATOR****AZ39151****Absolute Maximum Ratings (Note 1)**

Parameter	Symbol	Value		Unit
Input Voltage	$V_{IN}$	15		V
Enable Voltage	$V_{EN}$	15		V
Operating Junction Temperature	$T_J$	150		°C
Storage Temperature Range	$T_{STG}$	-65 to 150		°C
Lead Temperature (Soldering, 10sec)	$T_{LEAD}$	260		°C
ESD (Human Body Model)	ESD	5000		V
ESD (Machine Model)	ESD	450		V
Thermal Resistance	$\theta_{JA}$	TO-252-4 (PPAK)	100	°C/W
		TO-252-5	100	

Note 1: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

**Recommended Operating Conditions**

Parameter	Symbol	Min	Max	Unit
Input Voltage	$V_{IN}$		13.5	V
Enable Voltage	$V_{EN}$		13.5	V
Operating Junction Temperature	$T_J$	-40	125	°C



**1.5A ULTRA LOW DROPOUT LINEAR REGULATOR**

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**Electrical Characteristics**

Operating Conditions:  $V_{IN}=V_{OUT}+1V$ ,  $I_{OUT}=10mA$ ,  $C_{IN}=10\mu F$ ,  $C_{OUT}=10\mu F$ ,  $T_J=25^{\circ}C$ , unless otherwise specified. The **Bold-face** applies over  $-40^{\circ}C \leq T_J \leq 125^{\circ}C$ .

Parameter	Symbol	Conditions	Min	Typ	Max	Unit	
Output Voltage	$V_{OUT}$		-1		1	%	
		$10mA \leq I_{OUT} \leq 1.5A$ , $V_{OUT}+1V \leq V_{IN} \leq 13.5V$	-2		2		
Line Regulation	$V_{RLINE}$	$V_{OUT}+1V \leq V_{IN} \leq 13.5V$		3	25	mV	
Load Regulation	$V_{RLOAD}$	$10mA \leq I_{OUT} \leq 1.5A$		10	50	mV	
Output Voltage Temperature Coefficient (Note 2)	$\Delta V_{OUT}/\Delta T$  $(\Delta V_{OUT}/V_{OUT})/\Delta T$			<b>100</b>	<b>500</b>	$\mu V/^{\circ}C$	
				<b>20</b>	<b>100</b>	ppm/ $^{\circ}C$	
Dropout Voltage (Note 3)	$V_{DROP}$	$\Delta V_{OUT}=1\%$	$I_{OUT}=100mA$		80	<b>200</b>	mV
			$I_{OUT}=750mA$		260		mV
			$I_{OUT}=1.5A$		375	<b>700</b>	mV
Ground Current	$I_{GND}$	$I_{OUT}=750mA$		5	<b>10</b>	mA	
		$I_{OUT}=1.5A$		17	<b>34</b>	mA	
Standby Current	$I_{STD}$	$V_{IN}=13.5V$ , $V_{EN}=0V$		130	<b>220</b>	$\mu A$	
Dropout Ground Pin Current	$I_{GND(DO)}$	$V_{IN} \leq V_{OUT(NOMINAL)} - 0.5V$		5		mA	
Short Circuit Current	$I_{SHORT}$	$V_{OUT}=0V$		2.8		A	
Output Noise Voltage (rms)		10Hz to 100kHz, $I_{OUT}=100mA$		200		$\mu V$	
Minimum Load Current	$I_{LOAD(MIN)}$				5	mA	
Power Supply Ripple Rejection	PSRR	$f=120Hz$ , $I_{OUT}=750mA$	49	65		dB	
<b>Enable Input</b>							
Enable Voltage	$V_{EN}$	Logic low (off)			<b>0.8</b>	V	
		Logic high (on)	<b>2.25</b>				
Enable Current	$I_{EN}$	$V_{EN}=V_{IN}$		15	<b>35</b>	$\mu A$	
		$V_{EN}=0.8V$			<b>4</b>		
Shutdown Output Current	$I_{OUT(SHDN)}$	$V_{EN} \leq 0.8V$ , $V_{OUT}=0V$ , $V_{IN} \leq 8V$		5	<b>10</b>	$\mu A$	

Note 2: Output voltage temperature coefficient is defined as the worst case voltage change divided by the total temperature range.

Note 3: Dropout voltage is defined as the input-to-output differential when the output voltage drops to 99% of its nominal value which is measured at  $V_{OUT}+1V$  applied to  $V_{IN}$ .



**1.5A ULTRA LOW DROPOUT LINEAR REGULATOR** **AZ39151**

**Typical Performance Characteristics**

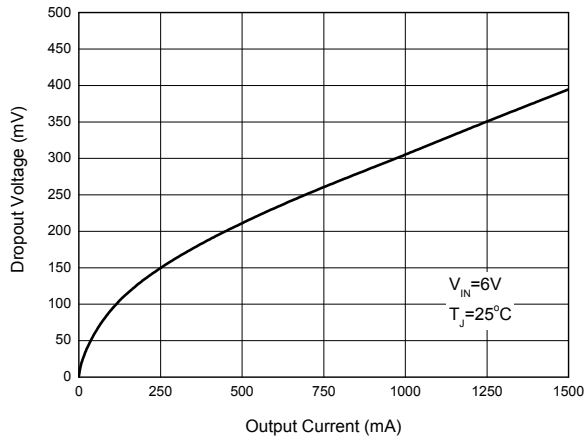


Figure 4. Dropout Voltage vs. Output Current

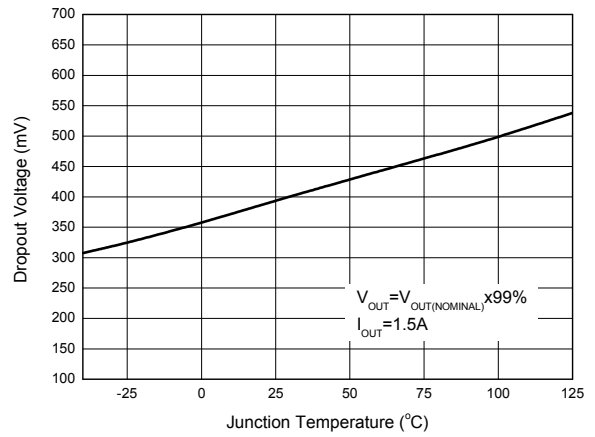


Figure 5. Dropout Voltage vs. Junction Temperature

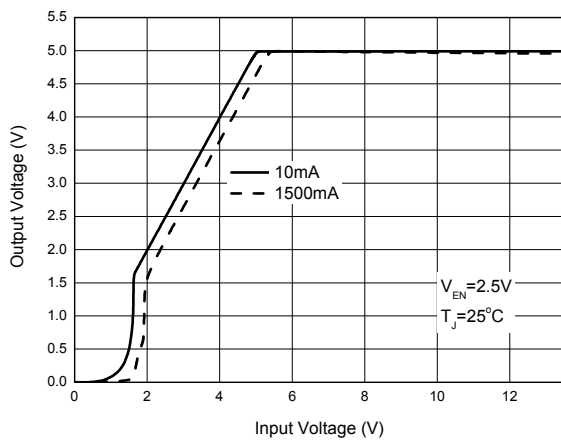


Figure 6. Output Voltage vs. Input Voltage

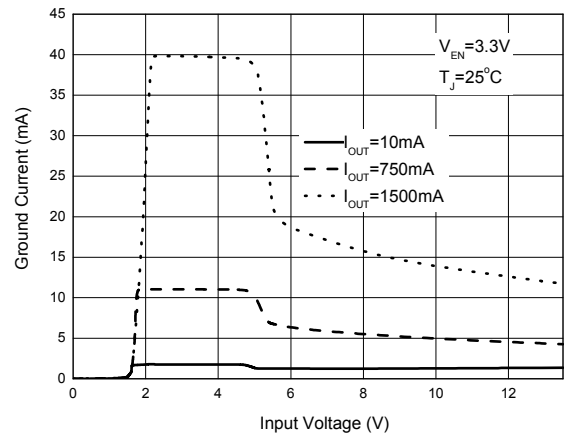


Figure 7. Ground Current vs. Input Voltage



**1.5A ULTRA LOW DROPOUT LINEAR REGULATOR**

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**Typical Performance Characteristics (Continued)**

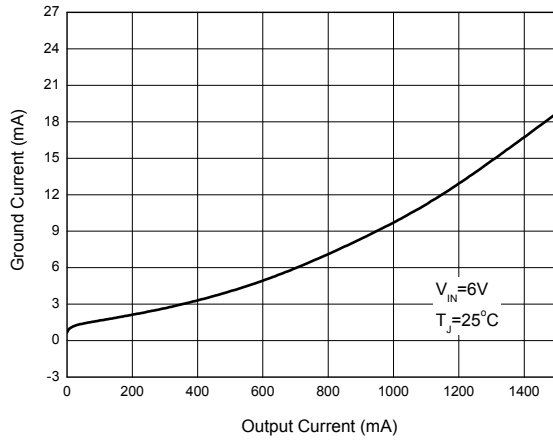


Figure 8. Ground Current vs. Output Current

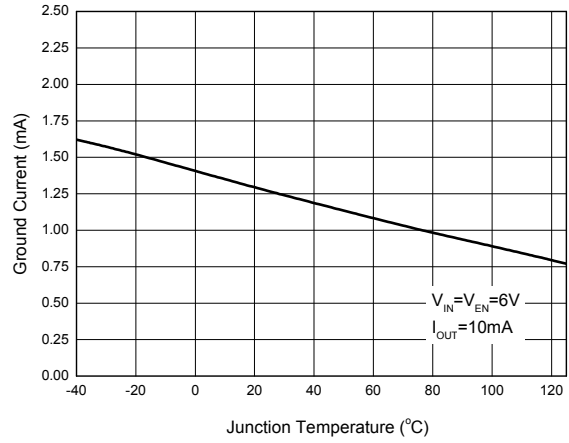


Figure 9. Ground Current vs. Junction Temperature

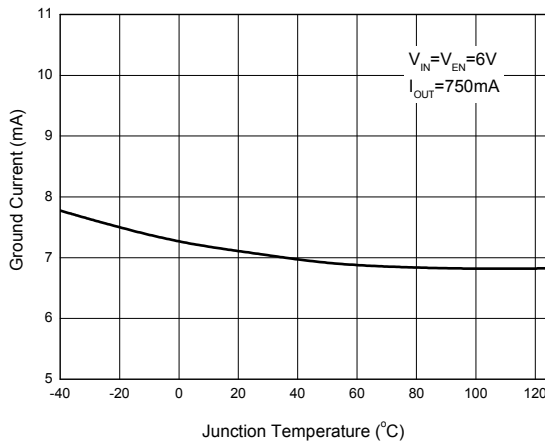


Figure 10. Ground Current vs. Junction Temperature

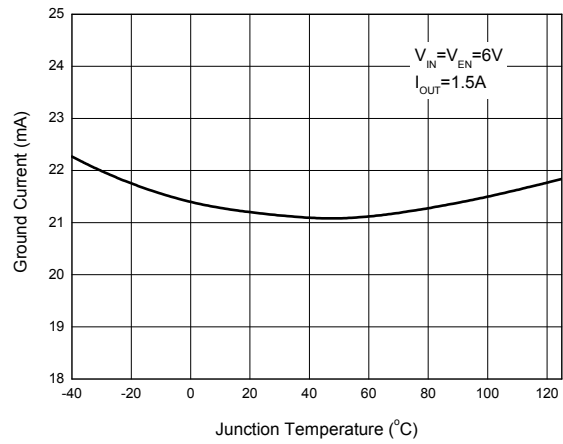


Figure 11. Ground Current vs. Junction Temperature





1.5A ULTRA LOW DROPOUT LINEAR REGULATOR

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Typical Performance Characteristics (Continued)

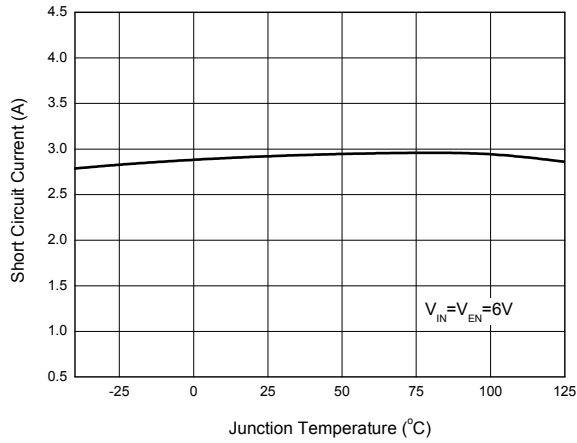


Figure 12. Short Circuit Current vs. Junction Temperature

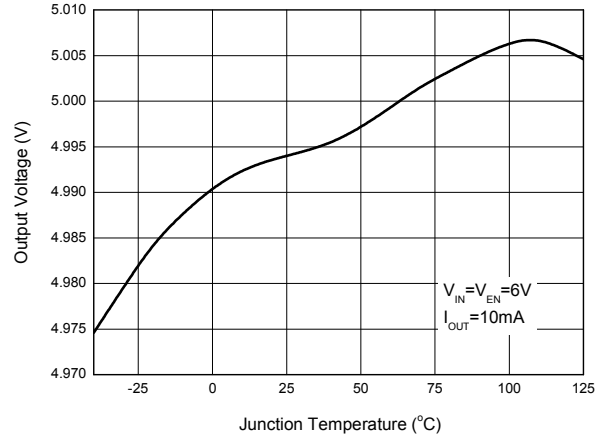


Figure 13. Output Voltage vs. Junction Temperature

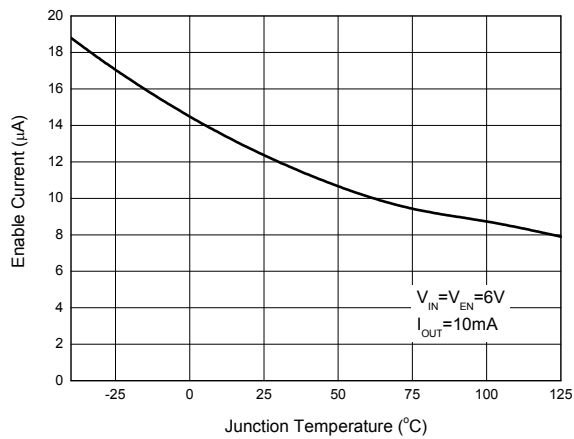


Figure 14. Enable Current vs. Junction Temperature

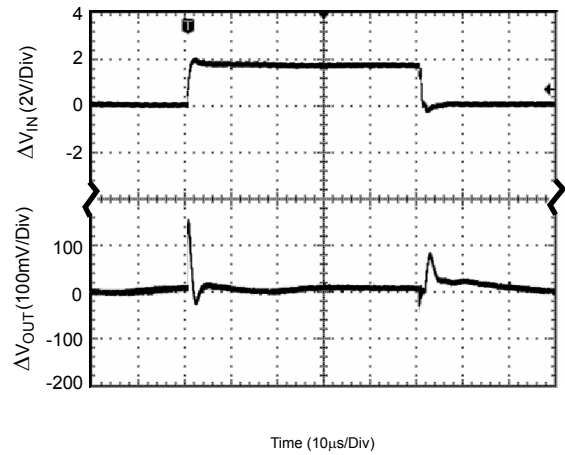


Figure 15. Line Transient  
(Conditions:  $V_{IN}=5$  to  $7V$ ,  $I_{OUT}=1.5A$ ,  $C_{OUT}=10\mu F$ )



**1.5A ULTRA LOW DROPOUT LINEAR REGULATOR**

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**Typical Performance Characteristics (Continued)**

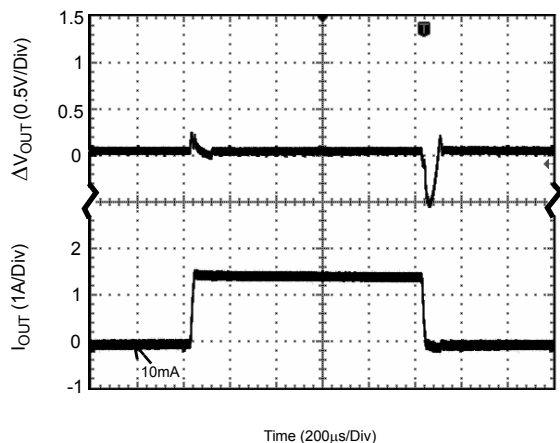


Figure 16. Load Transient

(Conditions:  $V_{IN}=6V$ ,  $I_{OUT}=10mA$  to  $1.5A$ ,  $C_{IN}=C_{OUT}=10\mu F$ )

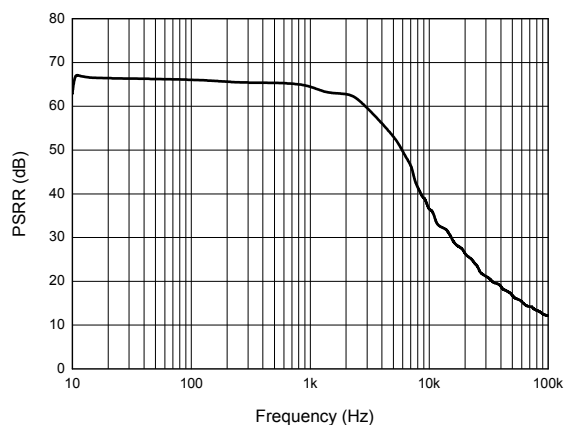


Figure 17. PSRR vs. Frequency

(Conditions:  $V_{IN}=6V$ ,  $I_{OUT}=10mA$ ,  $C_{IN}=C_{OUT}=10\mu F$ )

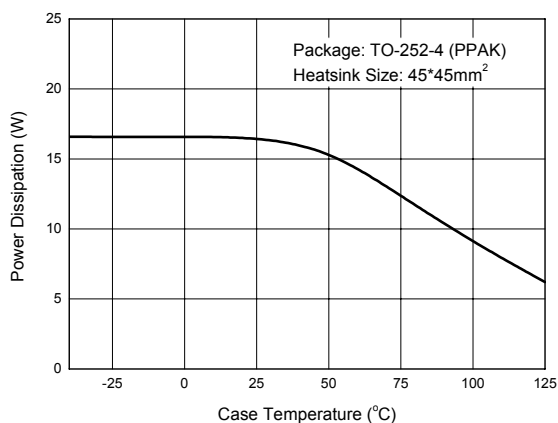
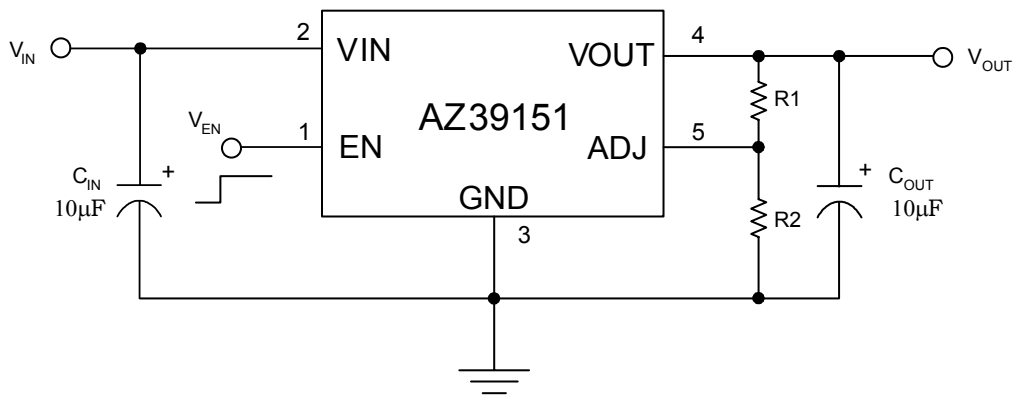
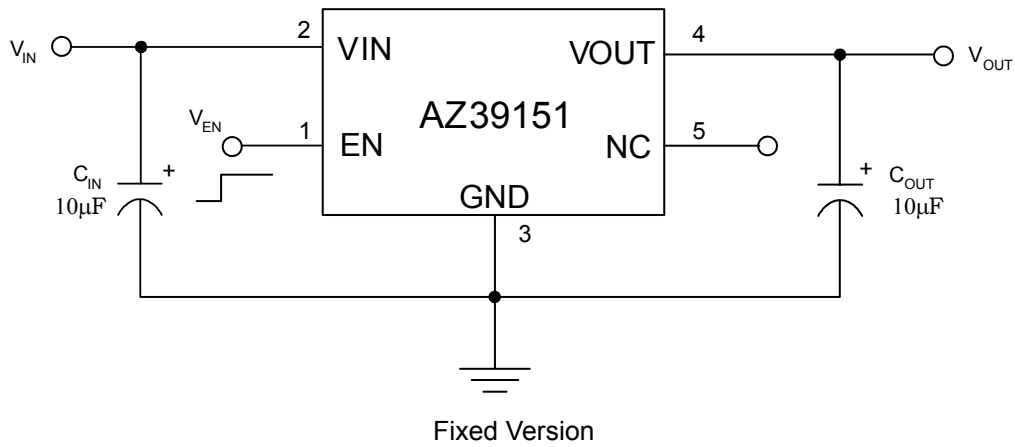


Figure 18. Power Dissipation vs. Case Temperature

**1.5A ULTRA LOW DROPOUT LINEAR REGULATOR** **AZ39151**

**Typical Application**



$$V_{OUT} = 1.25 * (1 + R1/R2) \text{ V}$$

Adjustable Version

Figure 19. Typical Application of AZ39151



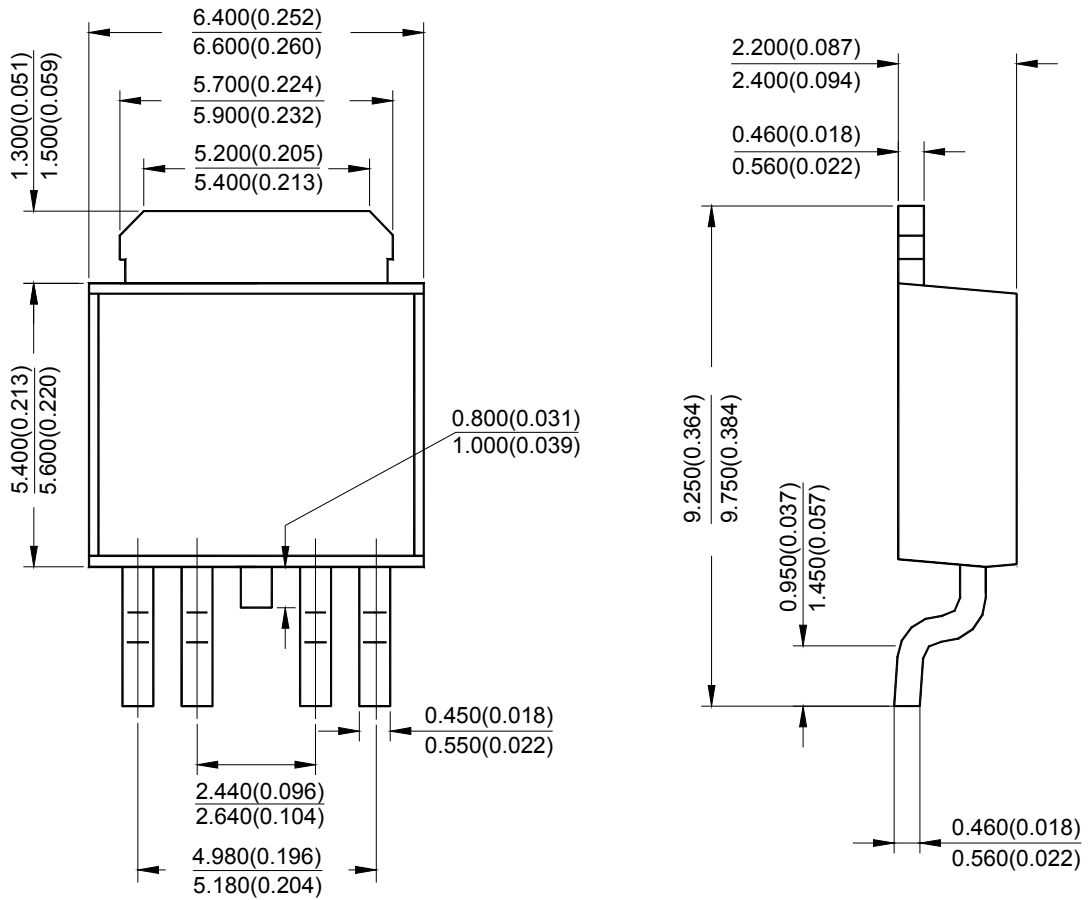
**1.5A ULTRA LOW DROPOUT LINEAR REGULATOR**

**AZ39151**

**Mechanical Dimensions**

**TO-252-4 (PPAK)**

**Unit: mm(inch)**



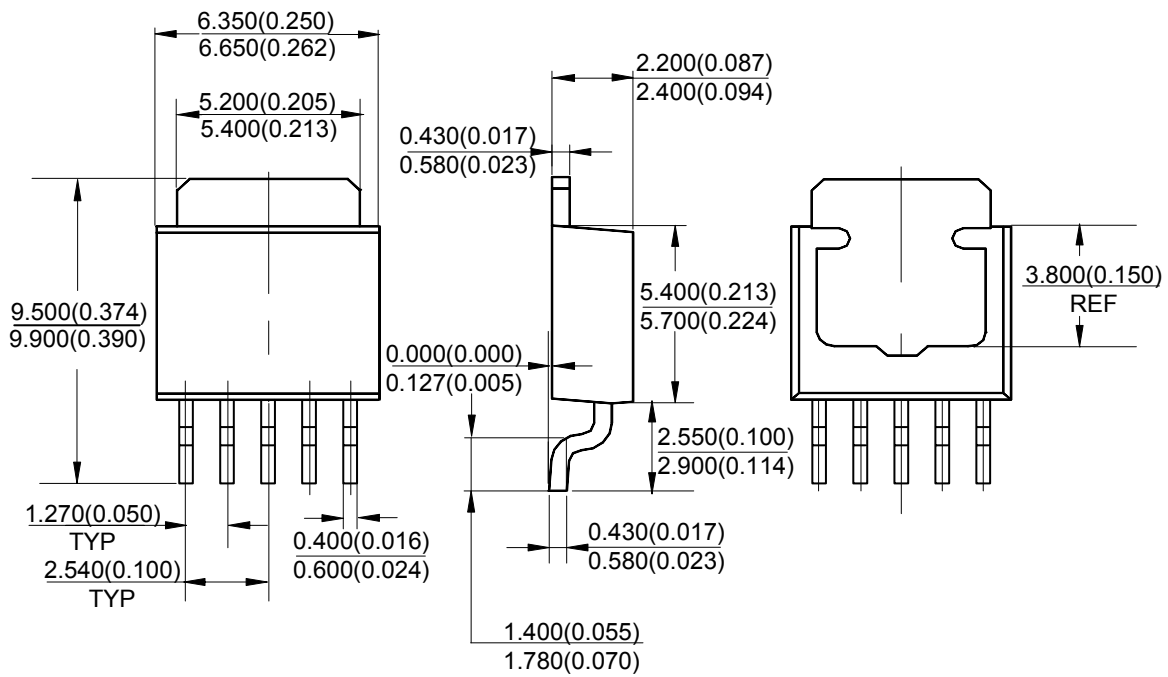


**1.5A ULTRA LOW DROPOUT LINEAR REGULATOR** **AZ39151**

**Mechanical Dimensions**

**TO-252-5**

**Unit: mm(inch)**





## **BCD Semiconductor Manufacturing Limited**

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