1.5A ULTRA LOW DROPOUT LINEAR REGULATOR AZ39150

General Description

The AZ39150 is low dropout three-terminal regulator with a typical dropout of 375mV at 1.5A output current.

The AZ39150 provides current limit and thermal shutdown. On-chip thermal shutdown provides protection against any combination of high current and ambient temperature that would create excessive junction temperatures.

The AZ39150 is available for 3.3V and 5.0V versions now. It is available in the industry standard TO-220-3 and TO-263-3 power packages.

Features

- Minimum Guaranteed Output Current: 1.5A
- Dropout Voltage: 375mV at I_{OUT}=1.5A
- Output Accuracy: 1%
- Low Ground Current
- Internal Current Limit and Thermal Protection
- Reversed-battery and Reversed-lead Insertion Protection
- Fast Transient Response

Applications

- LCD TV
- Set Top Box
- LCD Monitor
- SMPS Post Regulator
- Laptop, Palmtop and Notebook
- Portable Instrumentation
- USB Power Supply

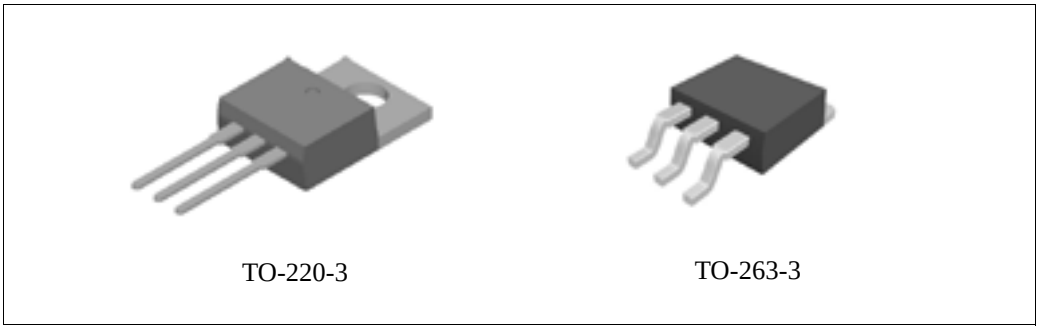


Figure 1. Package Types of AZ39150

1.5A ULTRA LOW DROPOUT LINEAR REGULATOR AZ39150

Pin Configuration

T Package
(TO-220-3)

S Package
(TO-263-3)

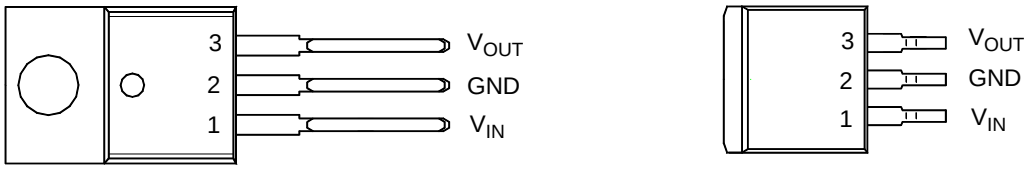


Figure 2. Pin Configuration of AZ39150 (Top View)

Pin Description

Pin Number	Pin Name	Function
1	V_{IN}	Unregulated input.
2	GND	The ground pin. This pin and TAB are internally connected.
3	V_{OUT}	Regulated Output.

Functional Block Diagram

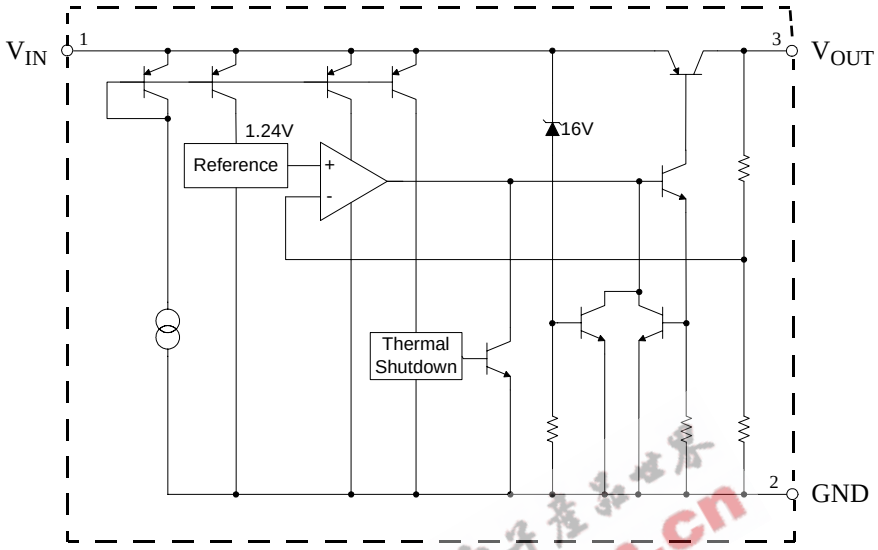


Figure 3. Functional Block Diagram of AZ39150

Ordering Information

AZ39150 □ - □ □ □

Circuit Type

Package
T: TO-220-3
S: TO-263-3

E1: Lead Free
Blank: Tin Lead

TR: Tape and Reel
Blank: Tube

3.3: Fixed Output 3.3V
5.0: Fixed Output 5.0V

Ordering Information (Continued)

Package	Temperature Range	Part Number		Marking ID		Packing Type
		Tin Lead	Lead Free	Tin Lead	Lead Free	
TO-220-3	-40 to 125°C	AZ39150T-3.3	AZ39150T-3.3E1	AZ39150T-3.3	AZ39150T-3.3E1	Tube
		AZ39150T-5.0	AZ39150T-5.0E1	AZ39150T-5.0	AZ39150T-5.0E1	Tube
TO-263-3	-40 to 125°C	AZ39150S-3.3	AZ39150S-3.3E1	AZ39150S-3.3	AZ39150S-3.3E1	Tube
		AZ39150S-3.3TR	AZ39150S-3.3TRE1	AZ39150S-3.3	AZ39150S-3.3E1	Tape & Reel
		AZ39150S-5.0	AZ39150S-5.0E1	AZ39150S-5.0	AZ39150S-5.0E1	Tube
		AZ39150S-5.0TR	AZ39150S-5.0TRE1	AZ39150S-5.0	AZ39150S-5.0E1	Tape & Reel

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

Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Value	Unit
Supply Voltage	V_{IN}	15	V
Maximum Operating Junction Temperature	T_J	150	°C
Storage Temperature Range	T_{STG}	-65 to 150	°C
Lead Temperature (Soldering, 10sec)	T_{LEAD}	300	°C
ESD (Machine Model)		300	V

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
Supply Voltage	V_{IN}		13.2	V
Operating Junction Temperature	T_J	-40	125	°C

Electrical Characteristics

AZ39150-3.3V Electrical Characteristics

Operating Conditions: V_{IN}=4.3V, I_{OUT}=10mA, $C_{IN=}$10μF, C_{OUT}=10μF, T_J=25°C, unless otherwise specified. The **Boldface** applies over -40°C≤T_J≤125°C.

Parameter	Symbol	Condition		Min	Typ	Max	Unit
Output Voltage	V_{OUT}	I_{OUT}=10mA		3.27	3.3	3.33	V
		10mA≤I_{OUT}≤1.5A, 4.3V≤V_{IN}≤8V		**3.23**	**3.3**	**3.37**	V
Line Regulation	V_{RLINE}	I_{OUT}=10mA, 4.3V≤V_{IN}≤8V			2	17	mV
Load Regulation	V_{RLOAD}	V_{IN}=4.3V, 10mA≤I_{OUT}≤1.5A			6.6	**33**	mV
Output Voltage Temperature Coefficient	$\Delta V_{OUT}/\Delta T$	I_{OUT}=10mA			**66**	**330**	μV/°C
Dropout Voltage (Note 2)	V_{DROP}	ΔV_{OUT}=1%	I_{OUT}=100mA		80	**200**	mV
			I_{OUT}=750mA		260		mV
			I_{OUT}=1.5A		375	500	mV
Ground Current	I_{GND}	I_{OUT}=750mA, V_{IN}=4.3V			4	**20**	mA
		I_{OUT}=1.5A, V_{IN}=4.3V			17		mA
Current Limit	I_{LIMIT}	V_{OUT}=0V (Note 3)		2.0	2.8		A
Minimum Load Current	I_{LOAD} (MIN)				7	10	mA
Output Noise Voltage (rms)		10Hz to 100KHz, I_{OUT}=100mA, C_{OUT}=10μF			400		μV

Note 2: Dropout voltage is defined as the input-to-output differential when the output voltage drops to 99% of its norminal value which is measured at V_{OUT}+1V applied to V_{IN}.

Note 3: V_{IN}=$V_{OUT(NOMINAL)}$+1V.

Electrical Characteristics (Continued)

AZ39150-5.0V Electrical Characteristics

Operating Conditions: V_{IN}=6V, I_{OUT}=10mA, $C_{IN=}$10μF, C_{OUT}=10μF, T_J=25°C, unless otherwise specified. The **Boldface** applies over -40°C≤T_J≤125°C.

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Output Voltage	V_{OUT}	I_{OUT}=10mA	4.95	5.0	5.05	V
		10mA≤I_{OUT}≤1.5A, 6V≤V_{IN}≤8V	**4.90**	**5.0**	**5.10**	V
Line Regulation	V_{RLINE}	I_{OUT}=10mA, 6V≤V_{IN}≤8V		3	25	mV
Load Regulation	V_{RLOAD}	V_{IN}=6V, 10mA≤I_{OUT}≤1.5A		10	**50**	mV
Output Voltage Temperature Coefficient	$\Delta V_{OUT}/\Delta T$	I_{OUT}=10mA		**100**	**500**	μV/°C
Dropout Voltage (Note 2)	V_{DROP}	ΔV_{OUT}=1%, I_{OUT}=100mA		80	**200**	mV
		I_{OUT}=750mA		260		mV
		I_{OUT}=1.5A		375	500	mV
Ground Current	I_{GND}	I_{OUT}=750mA, V_{IN}=6V		4	**20**	mA
		I_{OUT}=1.5A, V_{IN}=6V		17		mA
Current Limit	I_{LIMIT}	V_{OUT}=0V (Note 3)	2.0	2.8		A
Minimum Load Current	I_{LOAD} (MIN)			7	10	mA
Output Noise Voltage (rms)		10Hz to 100KHz, I_{OUT}=100mA, C_{OUT}=10μF		400		μV

Note 2: Dropout voltage is defined as the input-to-output differential when the output voltage drops to 99% of its norminal value which is measured at V_{OUT}+1V applied to V_{IN}.

Note 3: V_{IN}=$V_{OUT(NOMINAL)}$+1V.

Typical Performance Characteristics

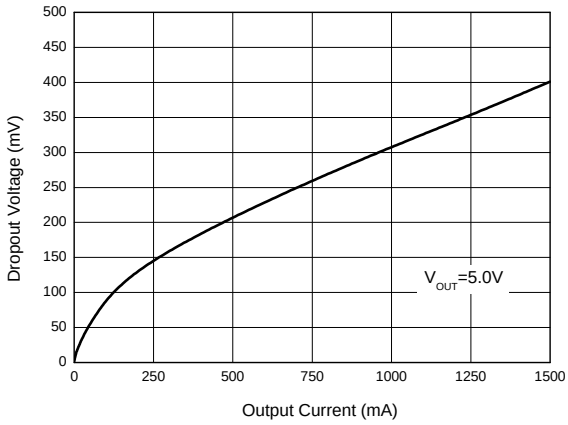


Figure 4. Dropout Voltage vs. Output Current

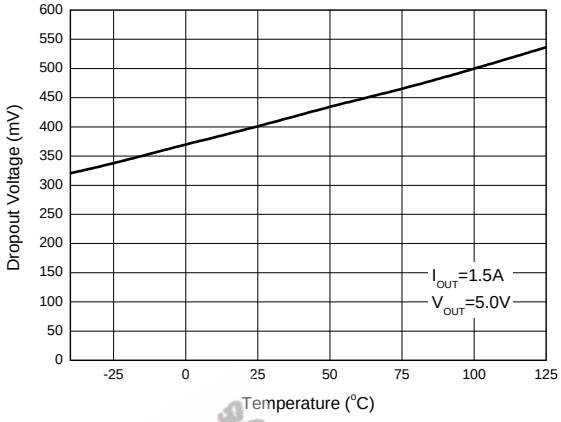


Figure 5. Dropout Voltage vs. Temperature

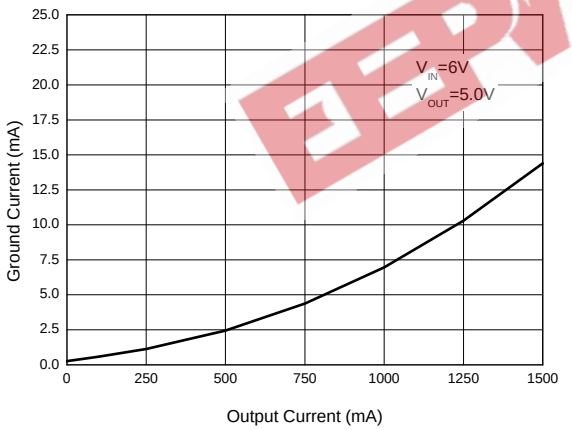


Figure 6. Ground Current vs. Output Current

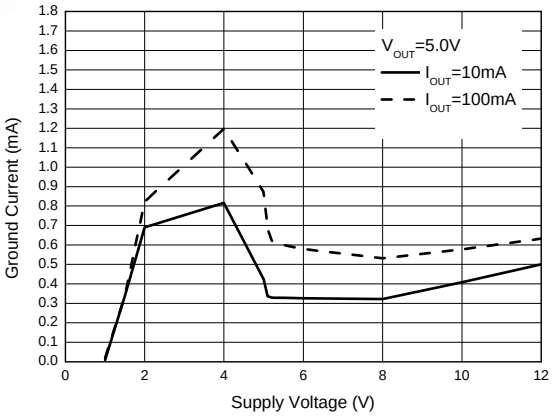


Figure 7. Ground Current vs. Supply Voltage

Typical Performance Characteristics (Continued)

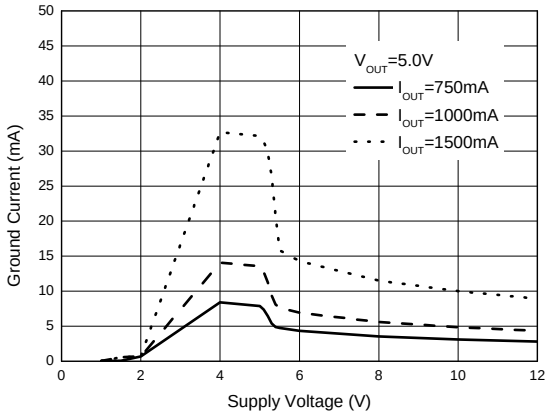


Figure 8. Ground Current vs. Supply Voltage

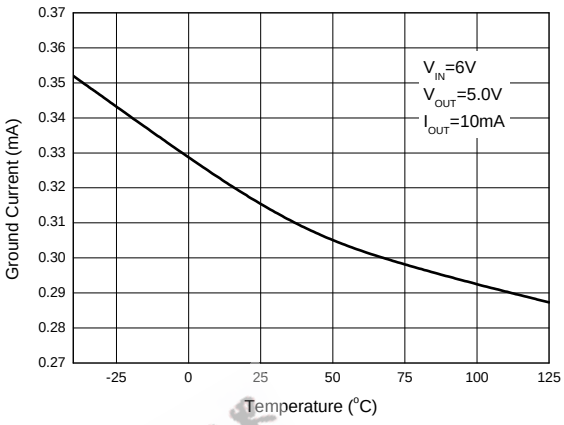


Figure 9. Ground Current vs. Temperature

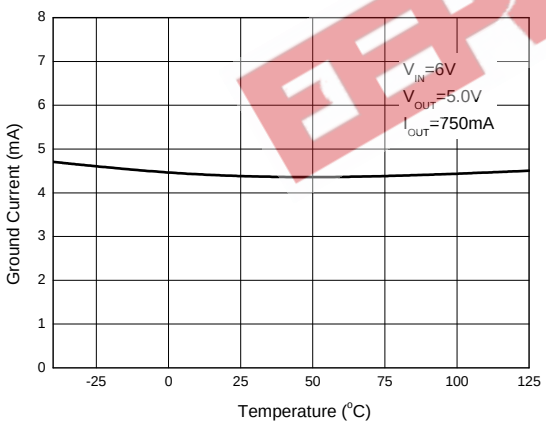


Figure 10. Ground Current vs. Temperature

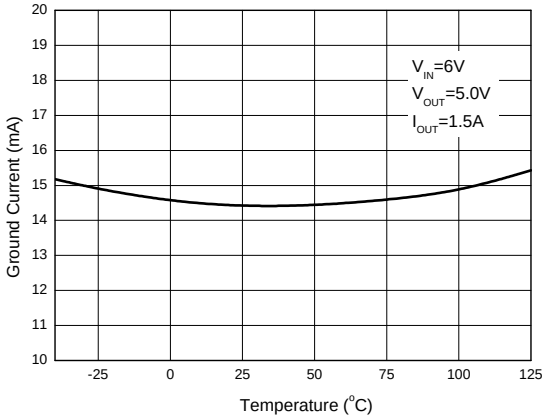


Figure 11. Ground Current vs. Temperature

Typical Performance Characteristics (Continued)

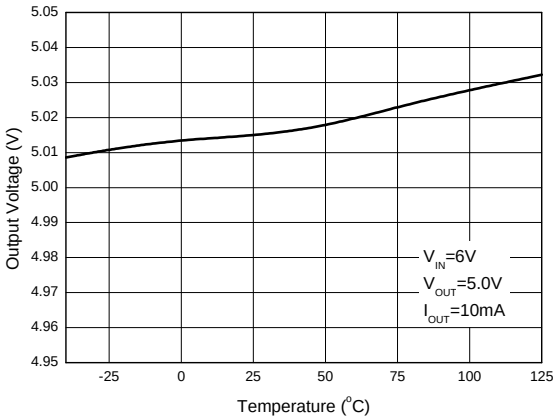


Figure 12. Output Voltage vs. Temperature

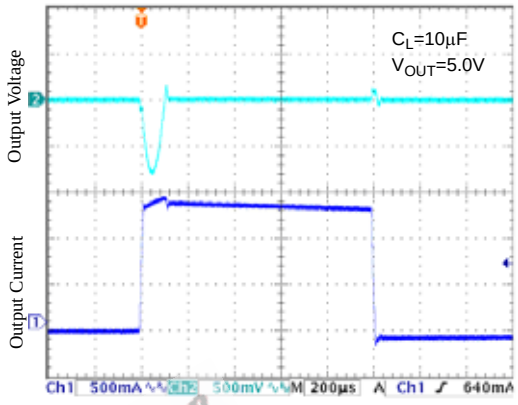


Figure 13. Load Transient

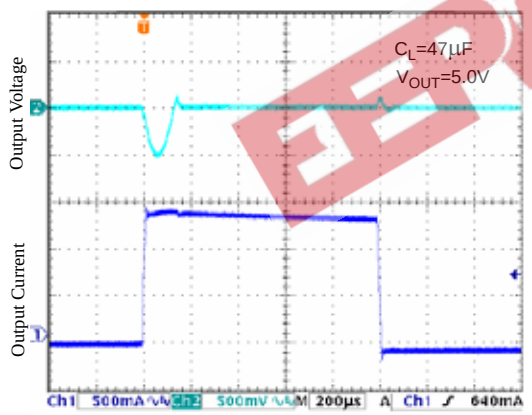


Figure 14. Load Transient

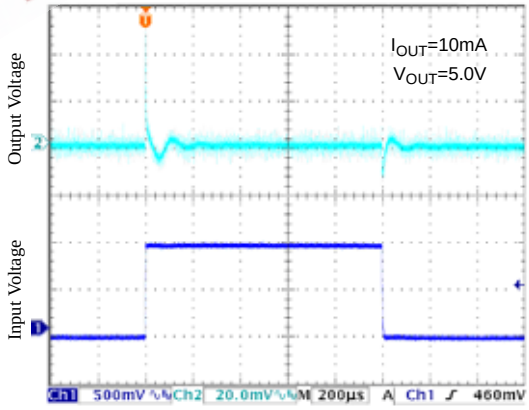


Figure 15. Line Transient

Typical Application

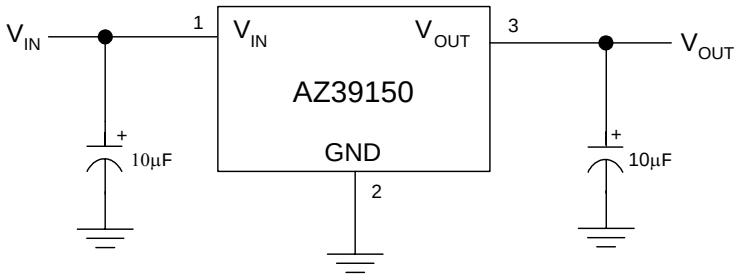
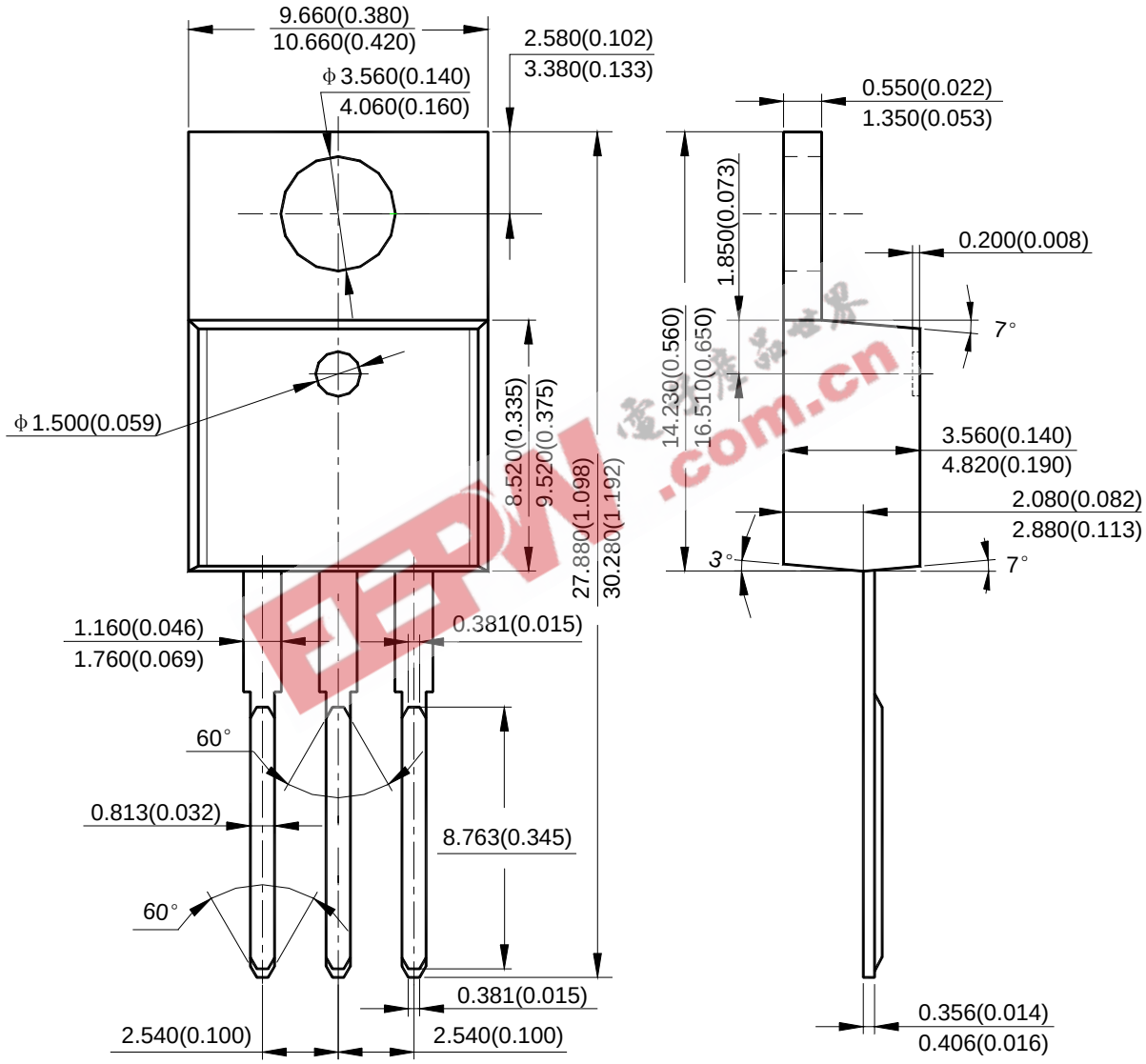


Figure 16. Typical Application of AZ39150

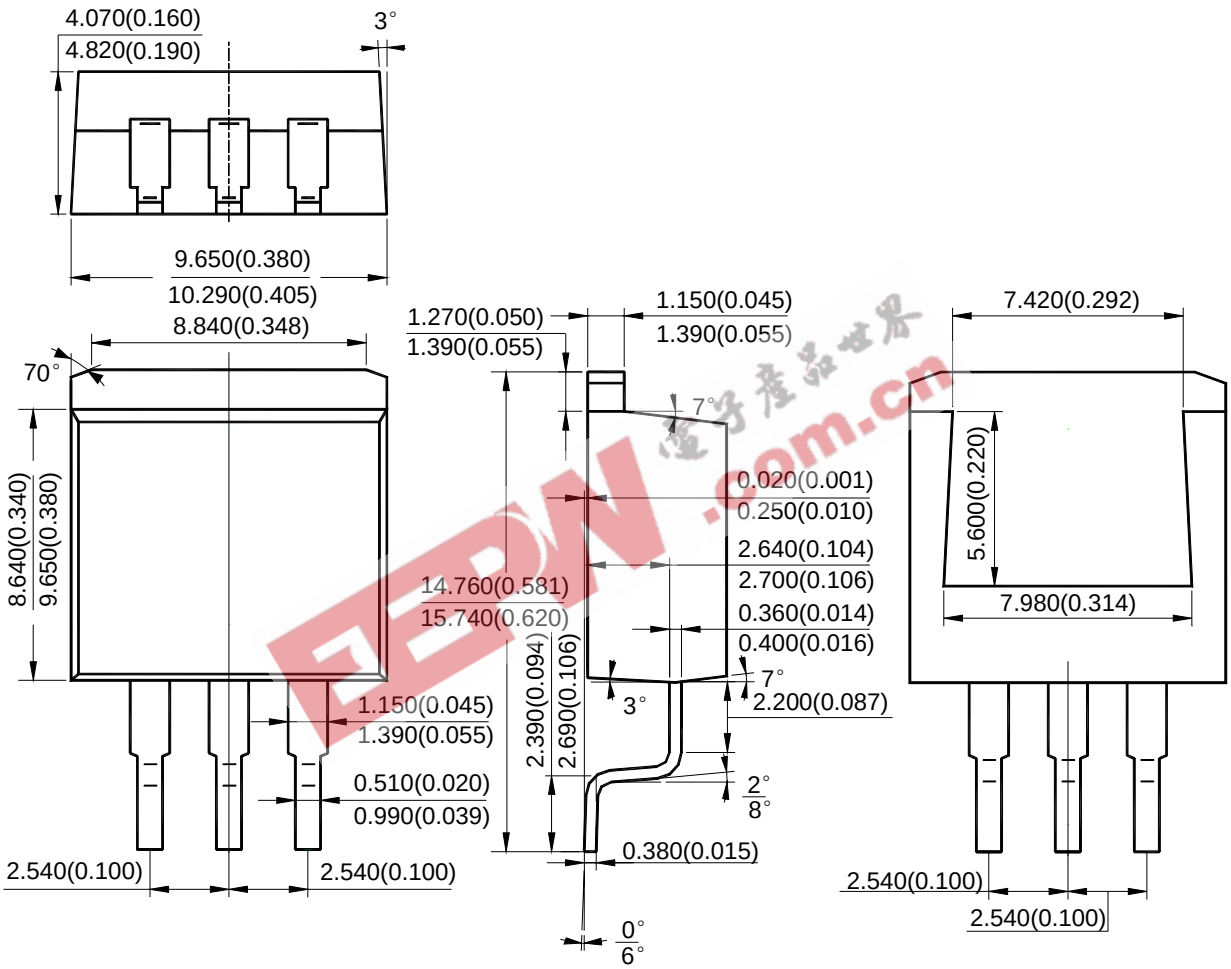
Mechanical Dimensions

TO-220-3 **Unit: mm(inch)**



Mechanical Dimensions (Continued)

TO-263-3 **Unit: mm(inch)**



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