

1.5A Ultra Low Dropout Linear Regulator**CL39150****■ General Description**

The CL39150 is a low dropout three-terminal regulator with a typical dropout of 375mV at 1.5A output current. The CL39150 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 CL39150 has 3.3V and 5.0V versions now.

The CL39150 is available in the industry standard TO-220-3, TO-263-3 packages.

■ Features

- Minimum Guaranteed Output Current: 1.5A
- Dropout Voltage at IOUT=1.5A: 375mV
- Output Accuracy: $\pm 1\%$
- Low Ground Current
- Fast Transient Response
- Internal Current Limit and Thermal Protection
- Reversed-battery and Reversed-lead Insertion Protection

■ Applications

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

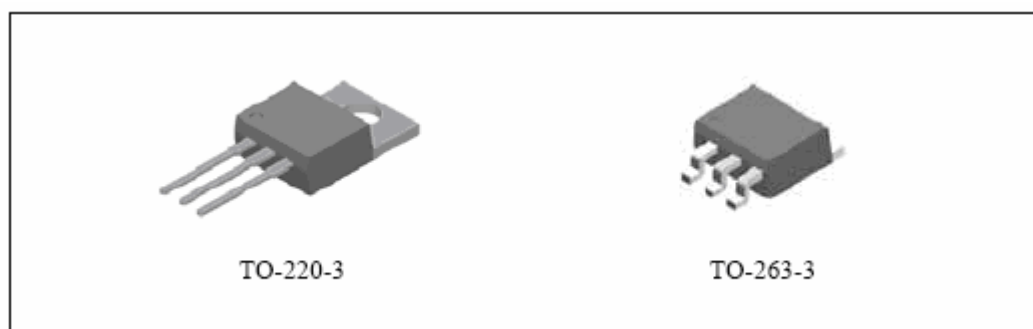


Figure 1. Package Types of CL39150

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Function Block

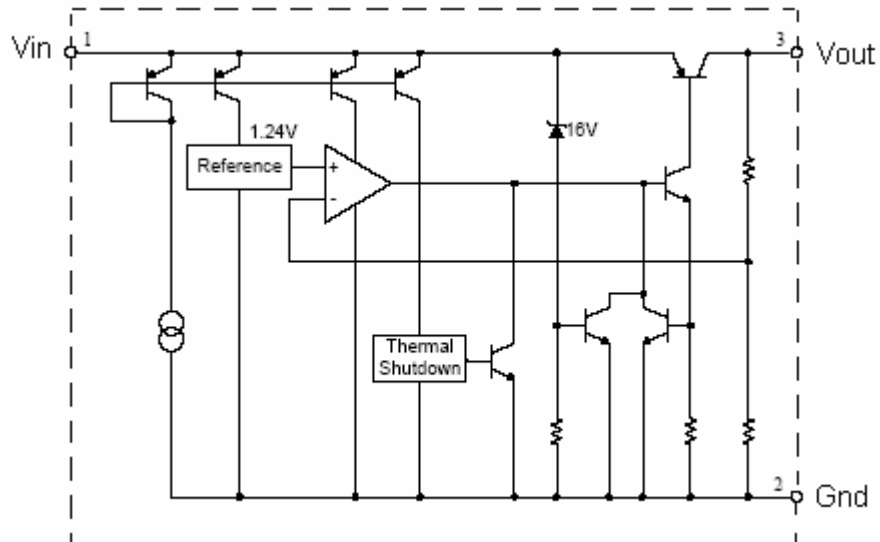


Figure 2. Functional Block Diagram of CL39150

Pin Descriptions

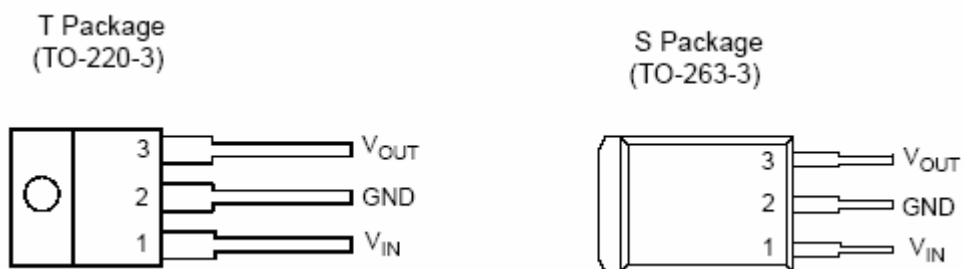


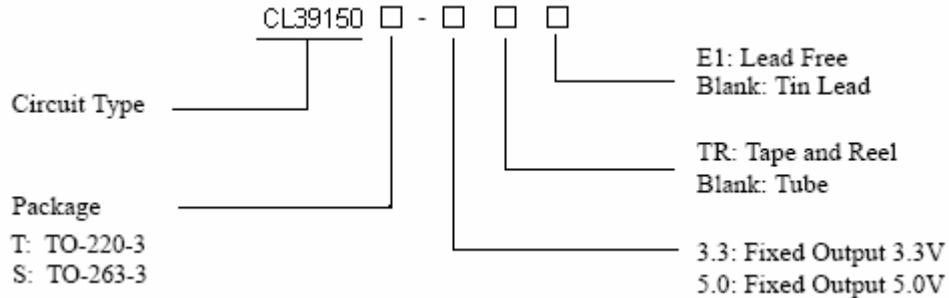
Figure 3. Pin Configuration of CL39150 (Top View)

Pin No.	Symbol	Function
1	V_{in}	Unregulated Input
2	GND	Ground pin. This pin and TAB are internally connected
3	V_{out}	Regulated Output

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Ordering Information



Package	Temperature Range	Part number (Lead Free)	Marking ID	Packing Type
TO-220-3	-40 to 125°C	CL39150T-3.3E1	CL39150T-3.3	Tube
		CL39150T-5.0E1	CL39150T-5.0	
TO-263-3	-40 to 125°C	CL39150S-3.3E1	CL39150S-3.3	Tube
		CL39150S-3.3TRE1	CL39150S-3.3	Tape & Reel
		CL39150S-5.0E1	CL39150S-5.0	Tube
		CL39150S-5.0TRE1	CL39150S-5.0	Tape & Reel

Absolute Maximum Ratings (Note1)

Symbol	Parameter	Range	Unit
V _{in}	Supply voltage	15	V
T _J	Maximum Operating Junction Temperature	150	°C
T _{stg}	Storage Temperature Range	-60 ~ 150	°C
T _{lead}	Lead Temperature (Soldering, 10sec)	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 (T_a = 25°C)

Parameter	Symbol	Range	Unit
Supply voltage	V _{in}	13.2	V
Operating Junction Temperature	T _J	-40 ~ 125	°C

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■ Electrical Characteristics (Continued)

CL39150-3.3V Electrical Characteristics

Operating Conditions: $V_{in}=4.3V$, $I_{out}=10mA$, $C_{in}=10\mu F$, $C_{out}=10\mu F$, $T_J=25^{\circ}C$, unless otherwise specified.

The **Boldface** applies over $-40^{\circ}C \leq T_J \leq 125^{\circ}C$.

Symbol	Parameter	Test Condition	Min	Typ.	Max	Unit
V _{out}	Output voltage	$I_{out}=10mA$	3.27	3.3	3.33	V
		$10mA \leq I_{out} \leq 1.5A$ $4.3V \leq V_{in} \leq 8V$	3.23		3.37	V
V _{RLINE}	Line Regulation	$I_{out}=10mA$, $4.3V \leq V_{in} \leq 8V$		2	17	mV
V _{RLOAD}	LOAD Regulation	$V_{in}=4.3V$, $10mA \leq I_{out} \leq 1.5A$		7	35	mV
$\Delta V_{out} / \Delta T$	Output Voltage Temperature Coefficient	$I_{out}=10mA$		66	330	$\mu V/^{\circ}C$
V _{DROP}	Dropout Voltage (Note 2)	$\Delta V_{out}=1\%$ $I_{out}=0.1A$		80	200	mV
		$I_{out}=1.5A$		375	550	mV
I _{GND}	Ground Current	$V_{in}=4.3V$ $I_{out}=0.75A$		4	20	mA
		$I_{out}=1.5A$		17		mA
I _{LIMIT}	Current Limit	$V_{out}=0V$ (Note 3)	2.0	2.8		A
I _{LO(min)}	Minimum Load Current			7	10	mA
V _{no}	Output Noise Voltage	10Hz to 100KHz, $I_{out}=0.1A$		400		μV_{rms}

Note 2: 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} .

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

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■ Electrical Characteristics (Continued)

CL39150-5.0V Electrical Characteristics

Operating Conditions: $V_{in}=6V$, $I_{out}=10mA$, $C_{in}=10\mu F$, $C_{out}=10\mu F$, $T_J=25^{\circ}C$, unless otherwise specified.

The **Boldface** applies over $-40^{\circ}C \leq T_J \leq 125^{\circ}C$.

Symbol	Parameter	Test Condition	Min	Typ.	Max	Unit
V _{out}	Output voltage	$I_{out}=10mA$	4.95	5	5.05	V
		$10mA \leq I_{out} \leq 1.5A$ $6V \leq V_{in} \leq 8V$	4.90		5.10	V
V _{RLINE}	Line Regulation	$I_{out}=10mA$, $6V \leq V_{in} \leq 8V$		3	25	mV
V _{RLOAD}	LOAD Regulation	$V_{in}=6V$, $10mA \leq I_{out} \leq 1.5A$		10	50	mV
$\Delta V_{out} / \Delta T$	Output Voltage Temperature Coefficient	$I_{out}=10mA$		100	500	$\mu V/^{\circ}C$
V _{DROP}	Dropout Voltage (Note 2)	$\Delta V_{out}=1\%$ $I_{out}=0.1A$		80	200	mV
		$I_{out}=1.5A$		375	550	mV
I _{GND}	Ground Current	$V_{in}=6V$ $I_{out}=0.75A$		4	20	mA
		$I_{out}=1A$		17		mA
I _{LIMIT}	Current Limit	$V_{out}=0V$ (Note 3)	2.0	2.8		A
I _{LO(min)}	Minimum Load Current			7	10	mA
V _{no}	Output Noise Voltage	10Hz to 100KHz, $I_{out}=0.1A$		400		μV_{rms}

Note 2: 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} .

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

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■ Test Circuit

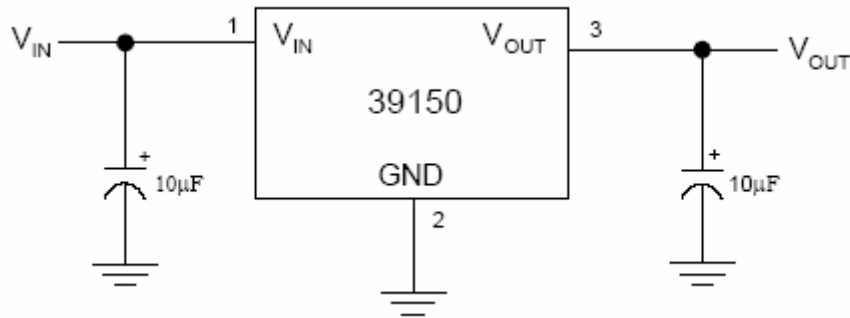


Figure 4. Test circuit of CL39150

■ Typical Performance Characteristics

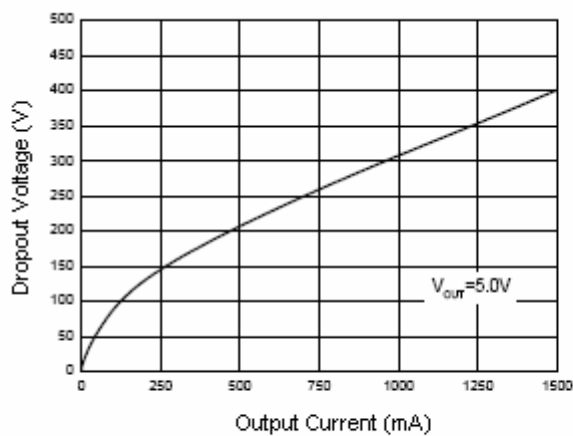


Figure 5. Dropout Voltage vs. Output Current

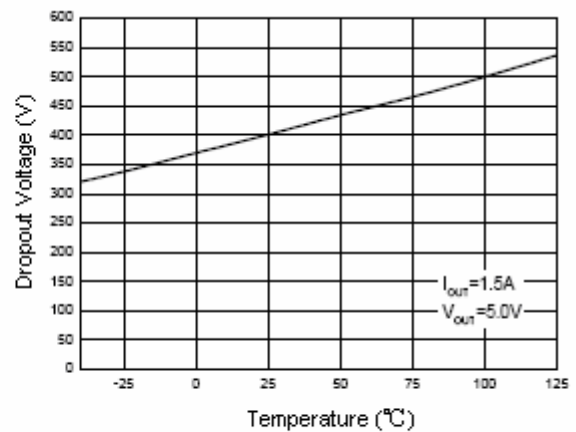


Figure 6. Dropout Voltage vs. Temperature

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Typical Performance Characteristics (Continued)

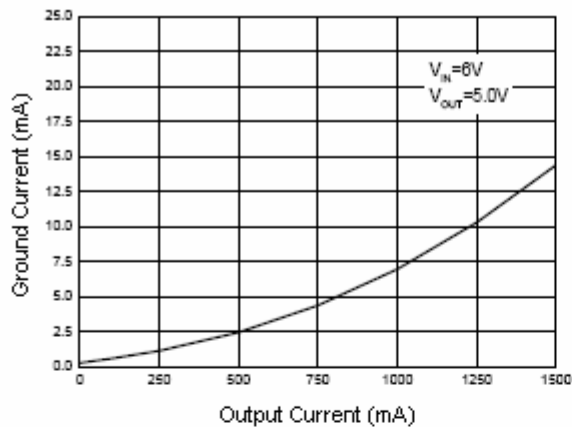


Figure 7. Ground Current vs. Output Current

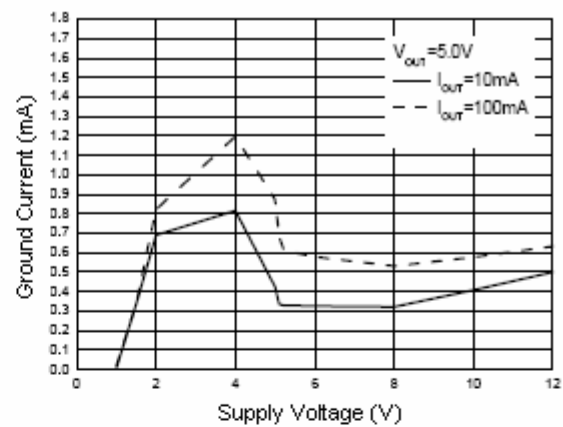


Figure 8. Ground Current vs. Supply Voltage

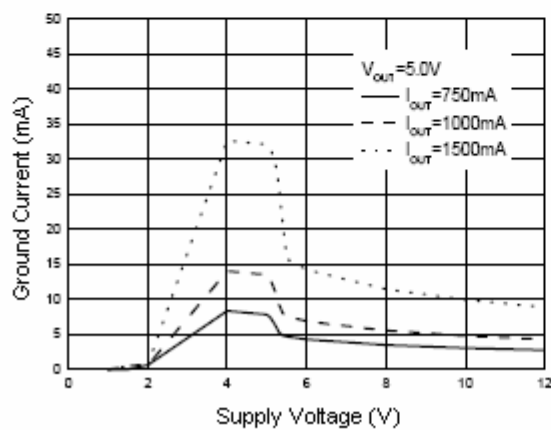


Figure 9. Ground Current vs. Supply Voltage

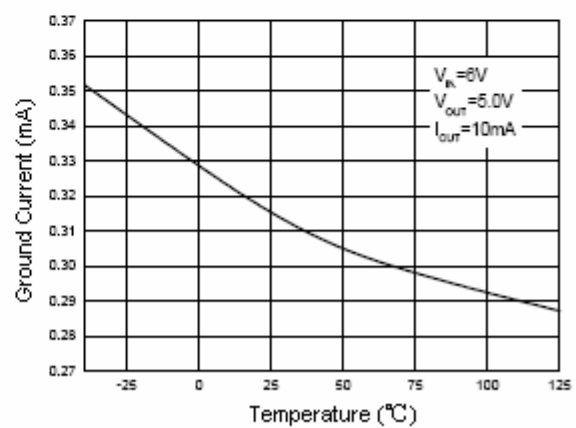


Figure 10. Ground Current vs. Temperature

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Typical Performance Characteristics (Continued)

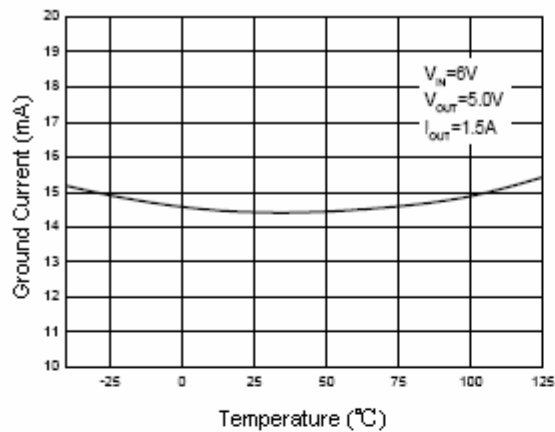


Figure 11. Ground Current vs. Temperature

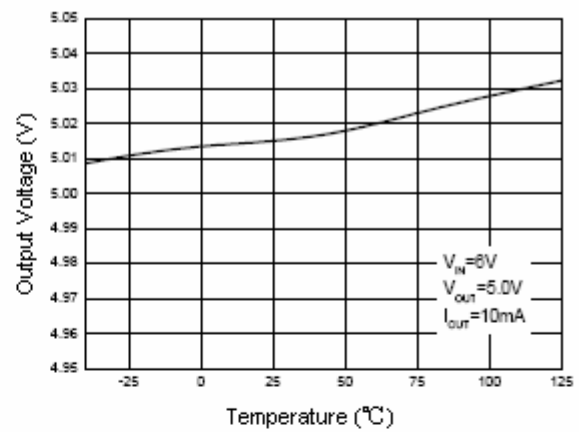


Figure 12. Output Voltage vs. Temperature

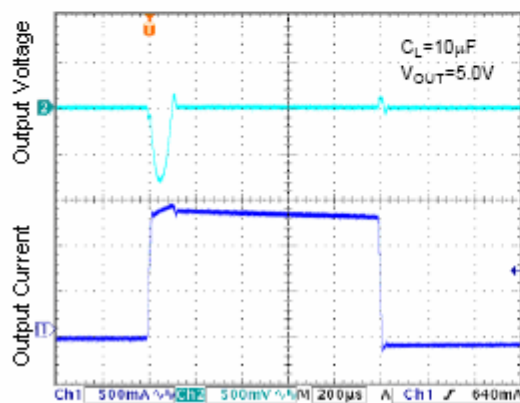


Figure 13. Load Transient

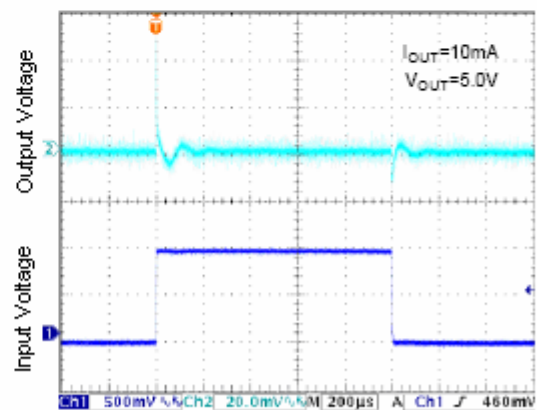


Figure 14. Line Transient

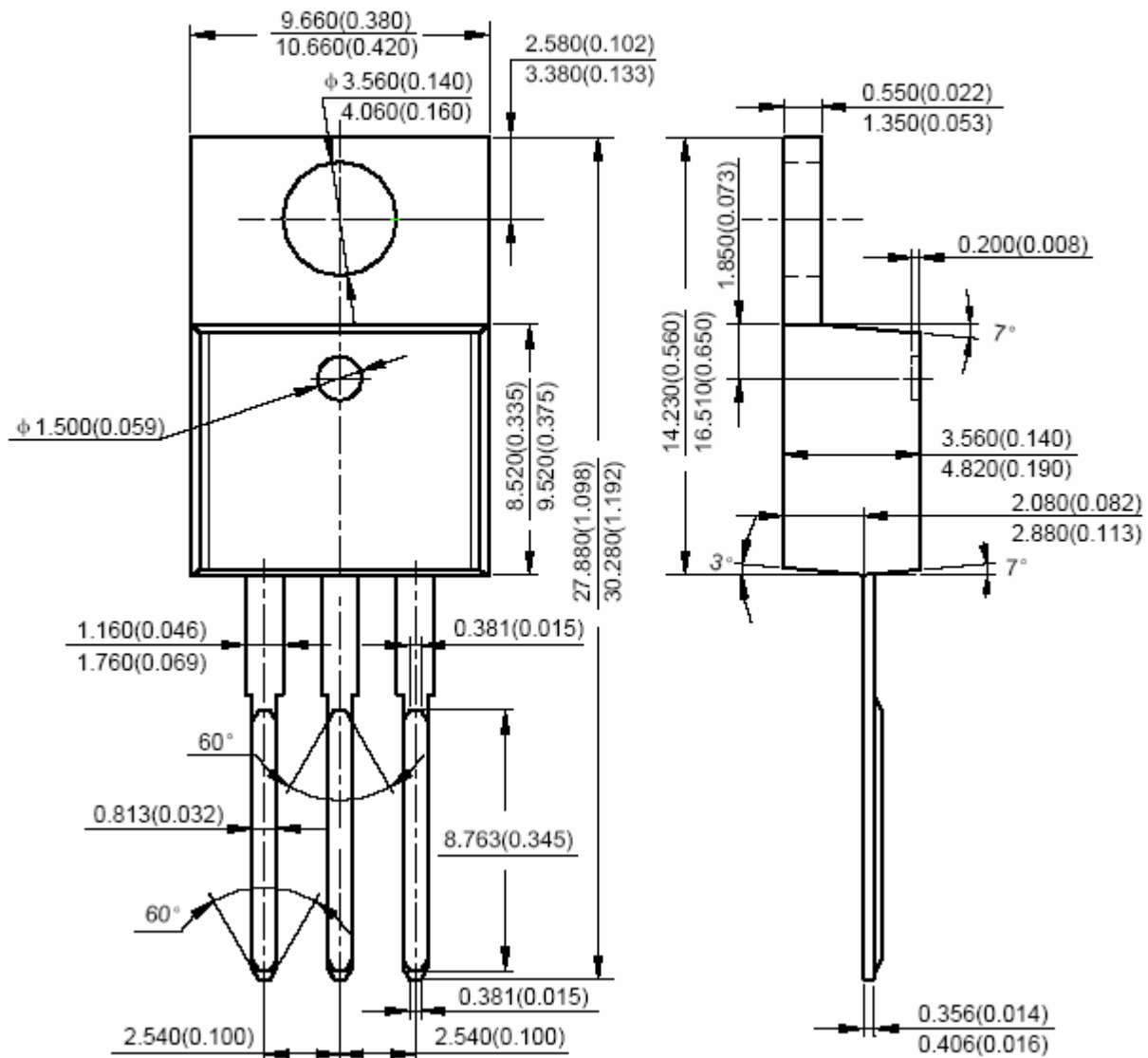
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■ Package Mechanical Data

TO-220-3

Unit: mm(inch)



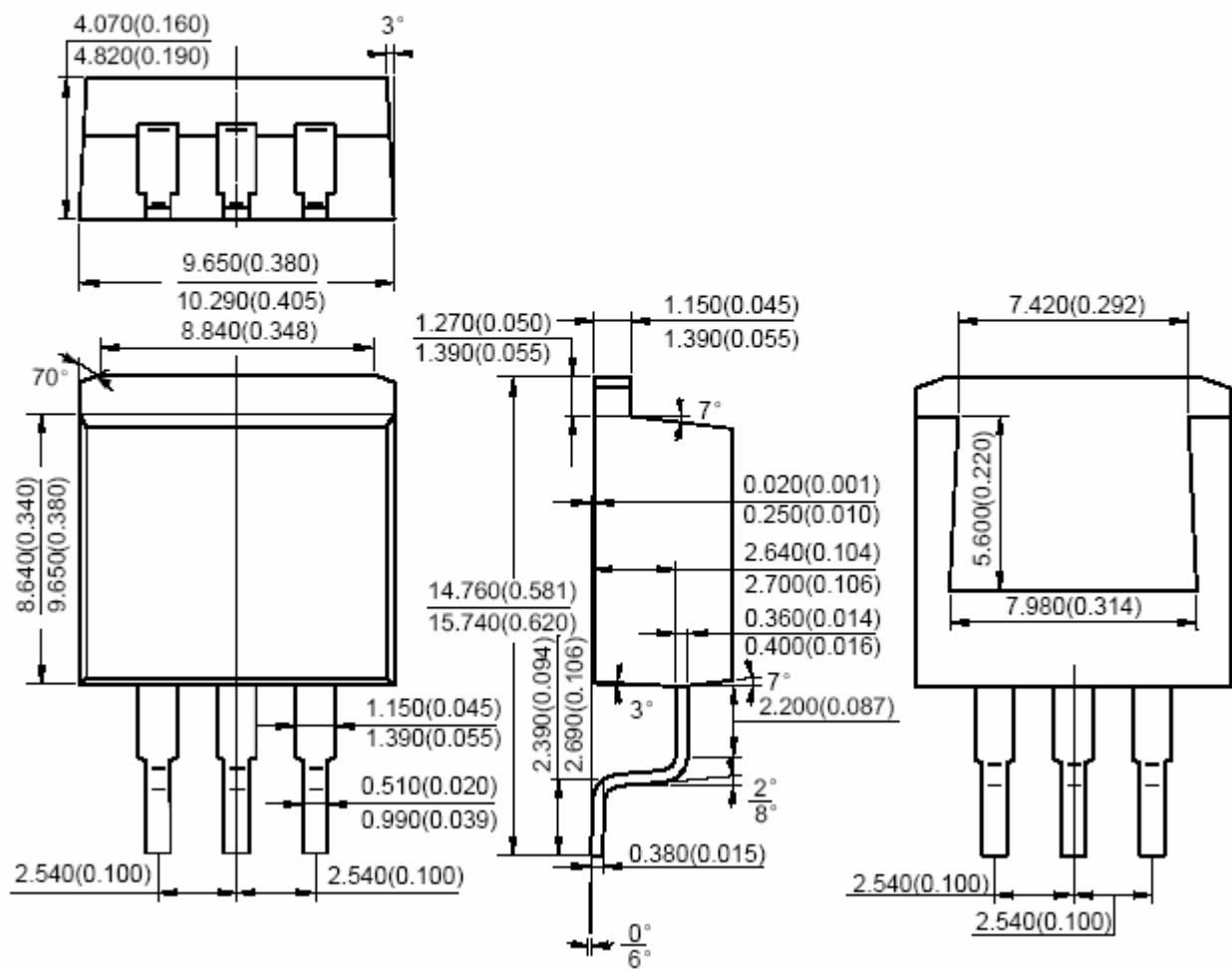
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■ Package Mechanical Data (Continued)

TO-263-3

Unit: mm(inch)



1.5A Ultra Low Dropout Linear Regulator**CL39150****IMPORTANT NOTICE**

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