

60V Input / 5V Output Linear Regulator

DESCRIPTION

BL8051 is a three-terminal positive regulator with an output voltage of 5.0V and output current up to 100mA. The device features a typical output tolerance of $\pm 5\%$. And its input voltage can stand a voltage as high as 60V.

BL8051 includes high accuracy voltage reference, error amplifier, TSD circuit and output driver module.

BL8051 offers thermal shut down functions to assure the stability of chip and power system.

BL8051 is available in SOT89-3, TO-92 and TO-220 power packages.

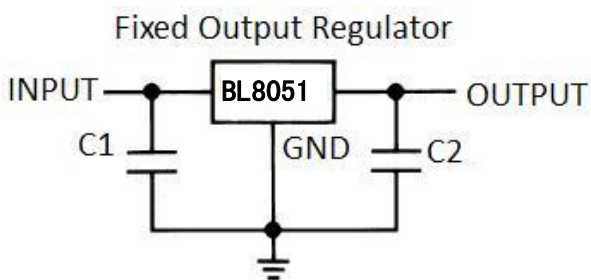
FEATURES

- Maximum output current up to 100mA
- Output voltage tolerances of $\pm 5\%$ over the temperature range
- Internal thermal over-temperature protection
- High input voltage (up to 60V)
- Low Power Consumption: 80uA (Typ.)
- Available in plastic TO-92 and plastic TO-220 packages
- No external components

APPLICATIONS

- Battery Powered equipment
- Communication equipment
- Audio/Video equipment

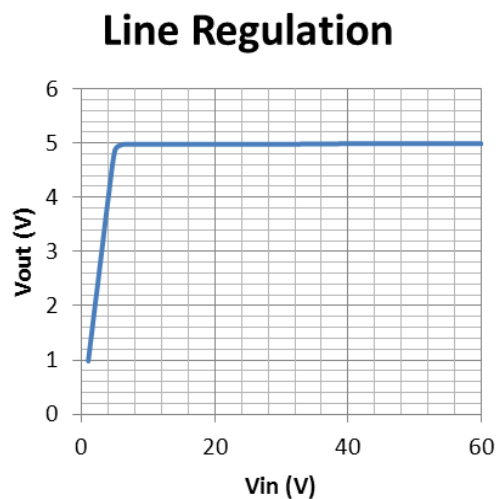
TYPICAL APPLICATION



Application circuit of BL8051

NOTE: Input capacitor ($C1=0.33\mu F$) and Output capacitor ($C2=0.1\mu F$) are recommended in all application circuit. Tantalum capacitor is recommended.

ELECTRICAL CHARACTERISTICS


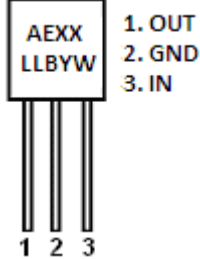
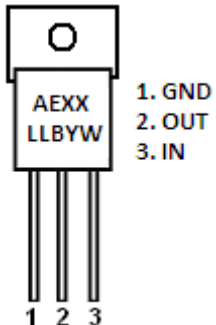


ORDERING INFORMATION

BL8051 1 2 3 4 5

Code	Description
1	Temperature&RoHS: C:-40~85°C ,Pb Free RoHS Std.
2	Package type: C3:SOT-89-3 H:TO-92 N: TO220
3	Packing type: TR:Tape&Reel (Standard) BG:Bag (TO-92)
4	Output voltage: e.g. 11=1.1V 15=1.5V 55=5.5V
5	Voltage accuracy: 2=±2% Blank(default)=±5%

PIN CONFIGURATION

Marking Explanation		BL8051CC3TR50 SOT89-3
AEXX LLBYW	N: Product Code	
	XX: Output Voltage	
	LL: LOT NO.	
	B: FAB Code	
	YW: Date Code	
Marking Explanation		BL8051CHBG50 TO92
AEXX LLBYW	N: Product Code	
	XX: Output Voltage	
	LL: LOT NO.	
	B: FAB Code	
	YW: Date Code	
Marking Explanation		BL8051CHBG50 TO220
AEXX LLBYW	N: Product Code	
	XX: Output Voltage	
	LL: LOT NO.	
	B: FAB Code	
	YW: Date Code	

RECOMMENDED WORK CONDITIONS

Parameter	Value
Input Voltage Range	7V - 60V
Operating Junction Temperature(Tj)	-20°C -85°C

ABSOLUTE MAXIMUM RATING

Parameter		Value
Max Input Voltage		60V
Max Output Current		100mA
Operating Junction Temperature(Tj)		150°C
Ambient Temperature(Ta)		-40°C –85°C
Power Dissipation	TO-92	0.5 W
	TO-220	1 W
	SOT89-3	0.5W
Storage Temperature(Ts)		-40°C -150°C
Lead Temperature & Time		260°C, 10s

Note:

- Exceed these limits may cause damage to the device.
- Exposure to absolute maximum rating conditions may affect device reliability.

ELECTRICAL CHARACTERISTICS

(Test Conditions: $C_{in}=0.33\mu F, C_{out}=0.1\mu F, T_A=25^\circ C$, Unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Vin	Input Voltage				60	V
Vout	Output Voltage	$1mA \leq I_{out} \leq 40mA$ $7V \leq V_{in} \leq 20V$	4.75	5.0	5.25	V
ΔV_{out}	Line Regulation	$7V \leq V_{in} \leq 20V$	-	-	200	mV
ΔV_{out}	Load Regulation	$1mA \leq I_{out} \leq 100mA$	-	-	150	mV
Iout(Max.)	Maximum Output	$V_{in}-V_{out}=1.5V$	100			mA
Iq	Quiescent Current	$V_{in}-V_{out}=1.25V$	-	0.08	0.15	mA
$\Delta V/\Delta T$	Temperature coefficient	$V_{in}=6.5V,$ $25^\circ C \leq Temp \leq 85^\circ C$			± 100	ppm
TSD	Over Temperature	$V_{in}=6.5V, I_{out}=1mA$	150			°C
θ_{JC}	Thermal Resistor	TO-92		10		°C / W
		TO-220		4.5		
		SOT89-3		20		

Note1: All test are conducted under ambient temperature 25°C and within a short period of time 20ms

BLOCK DIAGRAM

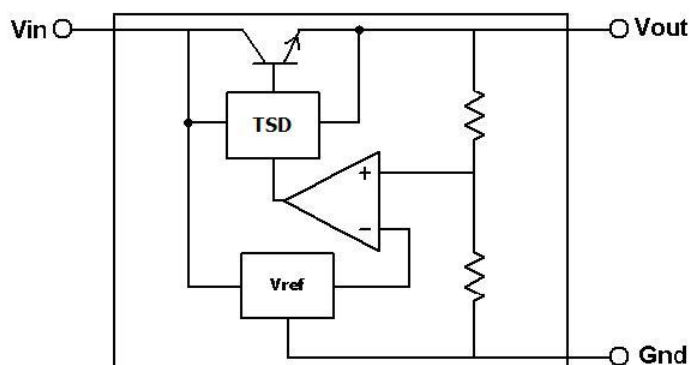


Fig.1 Block Diagram

EXPLANATION and THERMAL CONSIDERATION

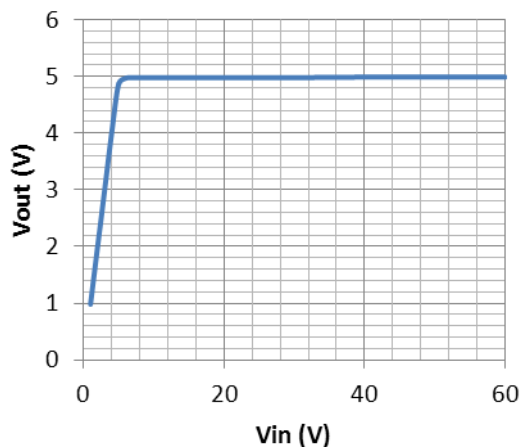
BL8051 is a series of low dropout voltage and low power consumption regulator. Its application circuit is very simple, which only needs two outside capacitors.

We have to take heat dissipation into great consideration when voltage of input is high. Because in such cases, the power dissipation consumed by BL8051 is very large. LC1029 uses SOT-89-3 package type and its thermal resistance is about $20^{\circ}\text{C}/\text{W}$. And the copper area of application board can affect the total thermal resistance. If copper area is $5\text{cm} \times 5\text{cm}$ (two sides), the resistance is about $30^{\circ}\text{C}/\text{W}$. So the total thermal resistance is about $20^{\circ}\text{C}/\text{W} + 30^{\circ}\text{C}/\text{W}$. We can decrease total thermal resistance by increasing copper area in application board. When there is no good heat dissipation copper are in PCB, the total thermal resistance will be as high as $120^{\circ}\text{C}/\text{W}$, then the power dissipation of BL8051 could allow on itself is less than 1W . And furthermore, BL8051 will work at junction temperature higher than 125°C under such condition and no lifetime is guaranteed.

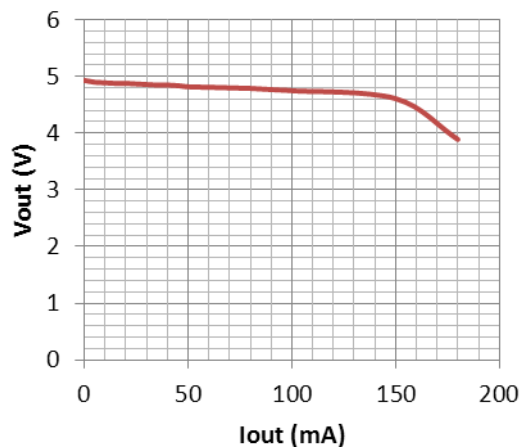
TYPICAL PERFORMANCE CHARACTERISTICS

($T=25^{\circ}\text{C}$ unless specified.)

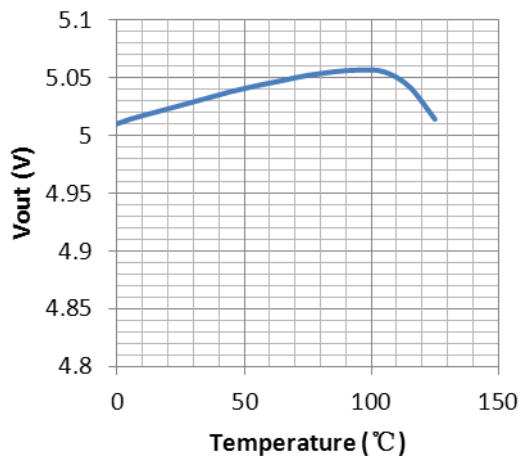
Line Regulation



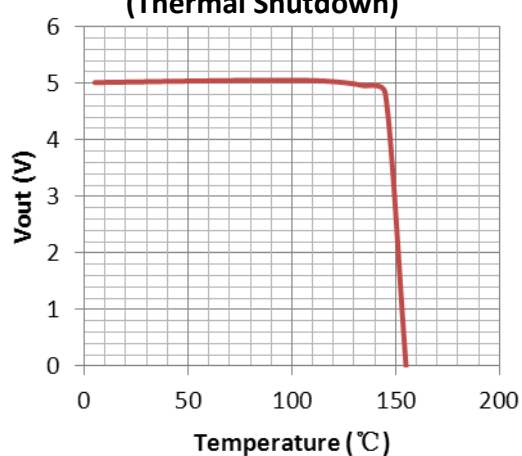
Load Regulation



Temperature Coefficient



TSD (Thermal Shutdown)



PACKAGE OUTLINE

Package	TO-92	Device per Box	1000	Unit	mm
Package specification:					
<p>Technical drawing of the TO-92 package. The front view shows a circular top with an 'EJECTION MARK' of diameter $\varnothing 1.6$ MAX and a depth of $\nabla 0.38$ MAX. The top diameter is 5.2 mm, and the diameter at the base of the top is 4.7 mm. The height of the top is 5.2 mm, and the distance from the top to the base of the leads is 4.9 mm. The total height of the package is 14.2 mm, and the distance from the top to the base of the leads is 12.7 mm. The lead spacing is 1.27 ± 0.05 mm, and the lead width is 0.55 mm TYP. The lead length is 2.54 ± 0.1 mm. The side view shows a top diameter of 4.19 mm and a diameter at the base of the top of 3.65 mm. The 'SEATING PLANE' is indicated, and the distance from the seating plane to the base of the leads is 2.29 MAX (UNCONTROLLED LEAD DIA). The lead width is 0.50 mm, and the lead length is 0.36 mm. The cross-sectional view shows a diameter of 2.27 mm and a diameter of 2.10 mm.</p> <p>DIMENSIONS ARE IN MILLIMETERS</p>					

Package	SOT-89-3	Devices per reel	1000	Unit	mm
Package specification:					
<p>Technical drawing of the SOT-89-3 package. The front view shows a rectangular top with a width of 4.5 ± 0.1 mm and a height of 1.6 ± 0.2 mm. The diameter of the central hole is $\varnothing 1.0$ mm. The distance from the top edge to the base of the leads is 0.4 mm. The distance from the top edge to the base of the leads is 2.5 ± 0.1 mm, and the maximum height of the package is 4.25 MAX. The lead spacing is 0.8 MIN. The side view shows a top width of 1.5 ± 0.1 mm and a height of 0.4 ± 0.1 mm. The bottom view shows a width of 0.42 ± 0.2 mm and a height of 0.47 ± 0.1 mm. The distance from the center to the edge of the leads is 1.5 ± 0.1 mm.</p>					

PACKAGE OUTLINE (Continued)

Package	TO-220	Devices per reel		Unit	mm
Package specification:					
<p>The technical drawing illustrates the BL8051 TO-220 package with the following dimensions:</p> <ul style="list-style-type: none"> Top View: <ul style="list-style-type: none"> Overall width: 9.90 ± 0.20 mm Distance from center to mounting hole: 1.30 ± 0.10 mm Mounting hole diameter: $\phi 3.60 \pm 0.10$ mm Distance between mounting holes: 8.70 mm Distance from center to lead edge: 2.80 ± 0.10 mm Lead length: 15.90 ± 0.20 mm Maximum lead length: 18.95 MAX. mm Lead thickness: 0.80 ± 0.10 mm Lead width: 1.27 ± 0.10 mm Lead angle: 45° Lead spacing: 1.52 ± 0.10 mm Lead length to mounting hole: 10.08 ± 0.30 mm Lead length to lead edge: 13.08 ± 0.20 mm Lead length to center: 9.20 ± 0.20 mm Lead length to lead edge (typical): 2.54 TYP [2.54 ± 0.20] mm Lead length to lead edge (typical): 2.54 TYP [2.54 ± 0.20] mm Side View: <ul style="list-style-type: none"> Lead length: 4.50 ± 0.20 mm Lead thickness: $1.30^{+0.10}_{-0.05}$ mm Lead width: $0.50^{+0.10}_{-0.05}$ mm Lead spacing: 2.40 ± 0.20 mm Bottom View: <ul style="list-style-type: none"> Overall width: 10.00 ± 0.20 mm 					