LC1920

WIDE RANGE, LINEAR LED DRIVER

DESCRIPTION

The LEADCHIP LC1920 is a high-voltage adjustable current source with accurate temperature compensation. The device is designed to provide a constant current source determined by an external sense resistor R_{sense}. The current is regulated with less than 10% error while input changes from 5V to 90V. With an external resistor (R1 in Figure 1) between VA and IS pin, the heat in the IC can be significantly reduced while keeping the summation of IC and R1 current to be constant. This is extremely useful in the area that power lines are not very stable. A typical application for the LC1920 is to drive LEDs with a constant current set by R_{sense}. They can also be used in parallel to provide higher current according to the bias. This device is available in TO-92, SOT89-3 and SOT-223 package.

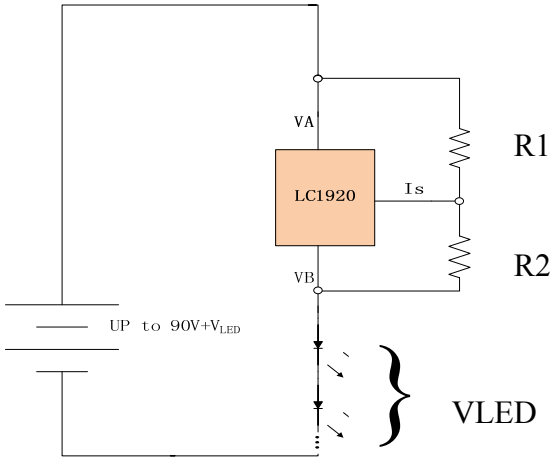
FEATURES

- Wide operation range: from 5V to 90V(V_A to V_B)
- I_{LED} can be programmed via changing R_{sense}
- Power dissipation can be adjusted
- Easy to use, only 3 pins and very little external components are needed
- Can be paralleled for higher current
- Temperature compensated

APPLICATIONS

- Industrial lamp indicators
- LED driver
- Accent lighting
- Automotive
- Constant current source
- Constant current sink

TYPICAL APPLICATION CIRCUIT



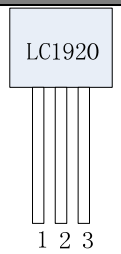
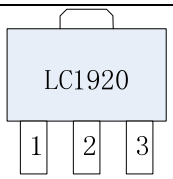
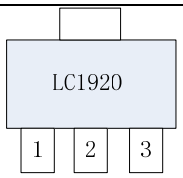
MARKING INFORMATION

Marking information		
Marking	**Description**	
1920 LLBYW	1920	Product code
	LL	Lot NO.
	B	FAB code
	Y	Date Code: Year
	W	Date Code: Week

ORDERING INFORMATION

LC1920 [1] [2] [3]	
Code	Description
[1]	Temperature & Rohs: C: -40~85°C,Pb Free Rohs Std.
[2]	Package type: H: TO-92 C3: SOT-89-3 L : SOT-223
[3]	Packing type: BG: Bag (TO-92) TR: Tape & Reel(standard)

PIN CONFIGURATION

Ordering Information		PIN Description
Package	TO-92	 1: IS 2: VB 3: VA
Product code	LC1920C HBG	
Package	SOT-89-3	 1: VA 2: VB 3: IS
Product code	LC1920C C3TR	
Package	SOT-223	 1: VA 2: VB 3: IS
Product code	LC1920C LTR	

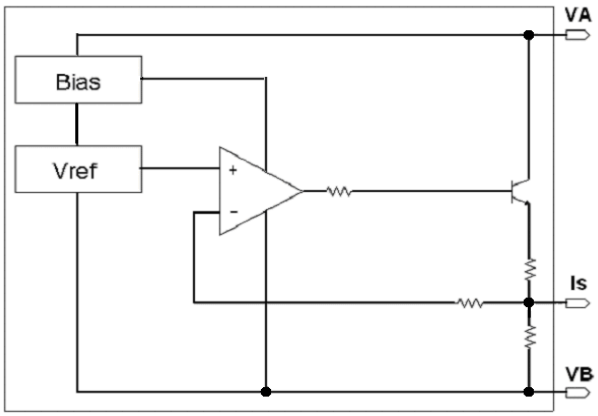
ABSOLUTE MAXIMUM RATING

Name	Symbol	Value		Unit
Max Supply Voltage	V_{A-B}	90		V
Thermal resistance	Θ_{JA}	TO-92	170	℃/W
		SOT-223	70	
		SOT-89-3	80	
Maximum Junction temperature	T_J	150		℃
Storage temperature	Tst	-55 to150		℃

ELECTRICAL CHARACTERISTICS

Symbol	Item	Conditions	Min	Typ	Max	Unit
V_{A-B}	Operating Input Voltage		5		90	V
I_{A-B}	Current regulation	V_{A-B}=5-90V, I_{SET}=20mA	-10		+10	%
V_{IS}	Current sense voltage			0.66		V
T_J	Operating junction temperature		-45		125	℃

BLOCK DIOGRAM



OPERATION

The LC1920 is a high voltage integrated constant current driver. It can operate in a wide range from 5V to 90V, and the output current can be programmed just by change the sense resistor. This module provides a precise regulated output current, the typical application is showed in figure 1.

As the LC1920 is a linear power supply, with high input voltage, the power dissipation should be considered. For example, if the set current is 20mA, when the V_{A-B} is 5V, the module dissipation

$$P_D = V_{A-B} \times I_{SET} \Rightarrow P_D = 0.1W$$

If the V_{A-B} is 90V, the power dissipation is as high as 1.8W. An external resistor R1 can be added to reduce the power dissipation of the LC1920. Then the power dissipation on the IC becomes

$$P_D \cong V_{A-B} \times (I_{SET} - \frac{V_{A-B} - V_{Sense}}{R_1})$$

When the ambient temperature is fixed, from thermal resistance value, the maximum power dissipation of the IC can be calculated. Say the maximum allowed temperature increase is 50°C, with TO-92 package (170°C/W thermal resistance), the maximum allowed power dissipation is 0.29W. Assume the maximum V_{A-B} is 50V, I_{set} = 20mA, and V_{sense} = 0.66V. Then

$$R_1 = (V_{A-B} - V_{sense})/(I_{SET} - \frac{P_D}{V_{A-B}}) = 3.5k\Omega$$

R1's power requirement can be calculated by

$$P_{R_1} \cong \frac{V_{A-B}^{\ 2}}{R_1} = 0.71W$$

Rsense can be calculated from sense voltage and current set:

$$R_{sense} = \frac{V_{IS}}{I_{SET}} = 33\Omega$$

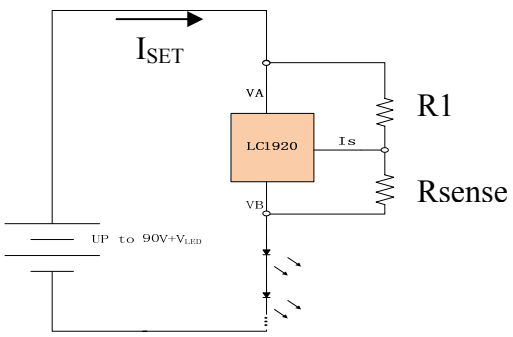
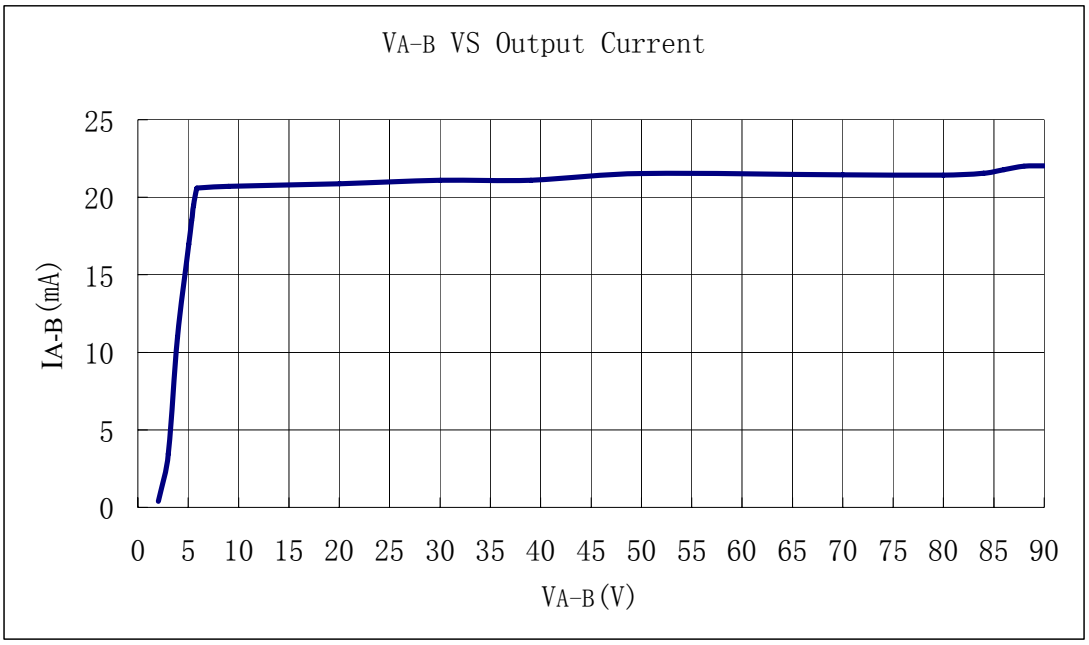


Figure1

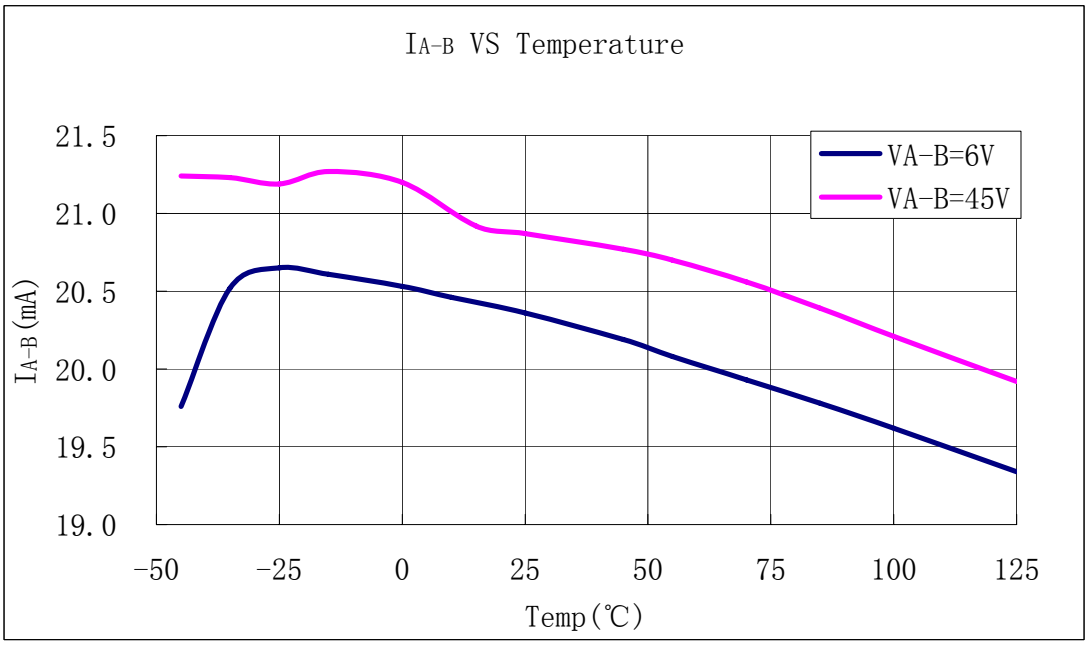
PERFORMANCE CHARACTERISTICS

(All the test done at I_{SET}=20mA)

Output current VS V_{A-B}



Temperature characteristics



APPLICATION CIRCUITS

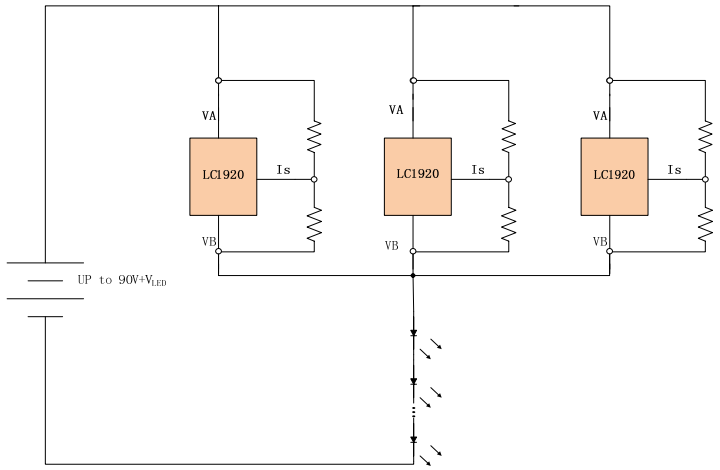


Figure2: For large current use

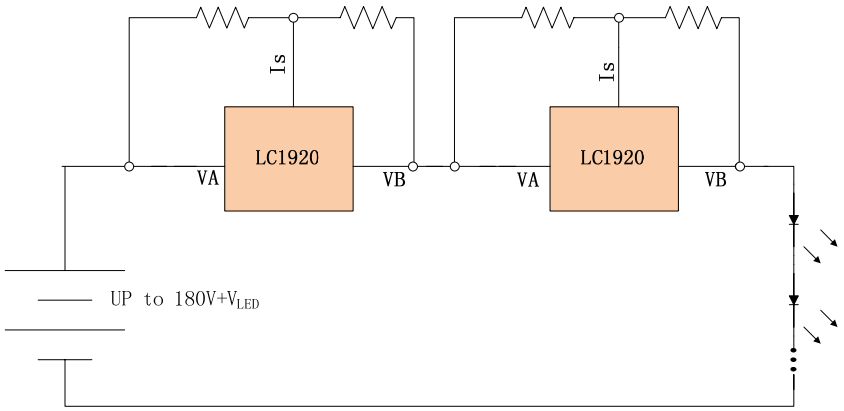


Figure3: For high input voltage use

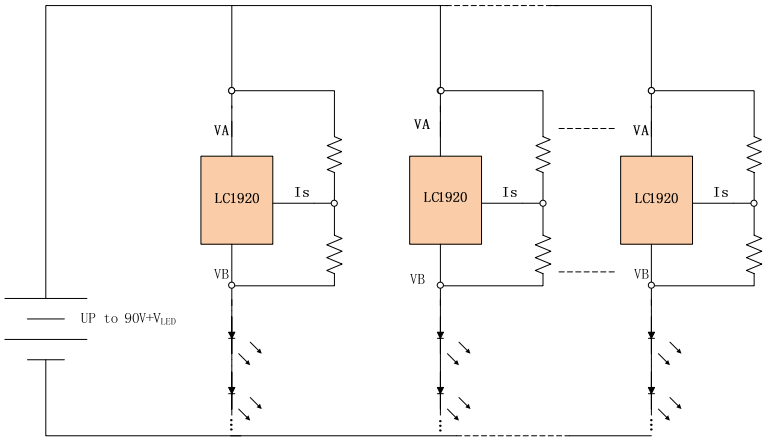
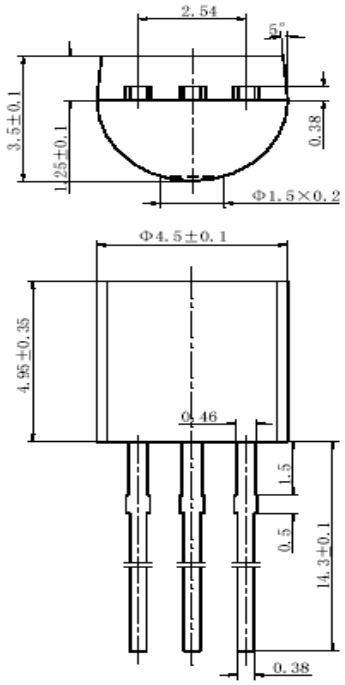


Figure4: For multiple LED strings use

PACKAGE INFORMATION

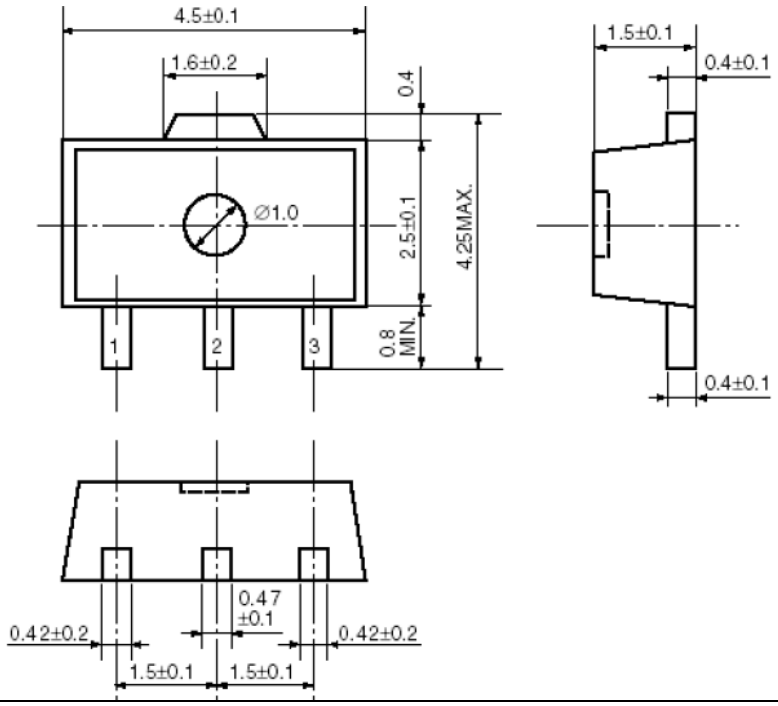
Package	TO-92	Devices per bag	3000Pcs	Unit	mm

Package dimension：



Package	SOT-89-3	Devices per reel	1000Pcs	Unit	mm

Package dimension：



Package	SOT223	Devices per reel	2500Pcs	Unit	mm

Package dimension：