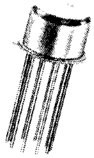
LAS 723, 723B

150 mA POSITIVE VOLTAGE REGULATORS/ LINEAR CONTROLLERS



FEATURES

- Guaranteed line regulation: 0.008%
- Guaranteed temperature coefficient: 0.015%
- Low noise, band gap reference
- Low reference voltage of 2.5 Volts
- Remote sense capability

DESCRIPTION

The LAS 723, 723B voltage regulators are monolithic integrated circuits designed for use in applications requiring a well regulated positive output voltage. Outstanding features include full power usage up to 150 milliamperes of load variation, internal current limiting, and thermal shutdown on the chip under most operating conditions. Hermetically sealed TO-96 packages are employed for high reliability and low thermal resistance. A low-noise temperature stable band gap reference is the key design factor insuring excellent temperature regulation of the LAS 723, 723B. This, coupled to a very low output impedance, insures superior performance and load regulation. A very low reference voltage of 2.5 volts ±5% compared to the 7.0 volts ±5% reference commonly used in similar devices, allows the LAS 723, 723B a much greater output voltage range without the use of external components. Both devices offer low standby current drain and high ripple rejection. When additional current capability is required, series NPN or PNP transistors may be added.

ABSOLUTE MAXIMUM RATINGS

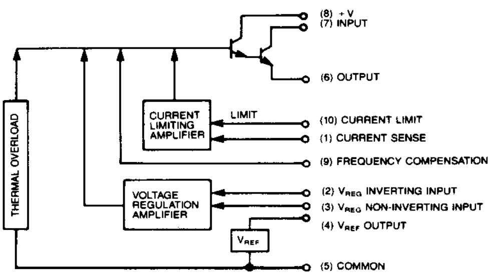
PARAMETER	SYMBOL	MAXIMUM	UNITS
Input Voltage LAS 723 LAS 723B	V_{IN}	 40(1) 50(1)	Volts
Input/Output Differential LAS 723 LAS 723B	V_{IN}-V_{OUT}	 38(1) 48(1)	Volts
Power Dissipation @ $T_A \leq 25°C$	P_D	0.8(1),(2)	Watts
Thermal Resistance Junction to Ambient	θ_{JA}	150	°C/Watt
Operating Junction Temperature Range	T_J	0 to 150	°C
Storage Temperature Range	T_{STG}	−65 to 150	°C
Lead Temperature (Soldering, 60 Seconds Time Limit)	T_{LEAD}	300	°C

(1) The maximum input voltage of the LAS 723, 723B is limited by the maximum input-output differential, maximum power dissipation, and the maximum current limit-safe operating area, whichever is less.
(2) For operation above 25°C T_{CASE} derate @ 6.7 mW/°C.

DEVICE SELECTION GUIDE

DEVICE	V_{IN}, VOLTS	V_O, VOLTS
LAS723	5 to 40	2.63 to 38
LAS723B	5 to 50	2.63 to 48

BLOCK DIAGRAM



ELECTRICAL CHARACTERISTICS

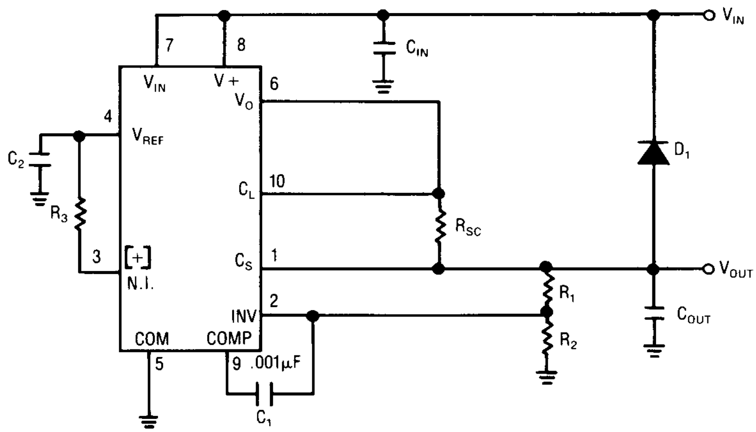
Test conditions are as follows: V_{IN} = 10 Volts, V_O = 5 Volts, I_O = 1 mA, R_{SC} = 0, unless otherwise specified.

Parameter	Symbol	Test Conditions			Test Limits		Units
		V_{IN}	I_O	T_J	Min	Max	
Output Voltage[1] LAS 723 LAS 723B	V_O	V_O + 2V	25mA	0-125°C	 2.63 2.63	 38 48	Volts
Input-Output Differential	V_{IN}-V_O		150mA	0-125°C	2.0		Volts
Output Current	I_O					150	mA
Line Regulation[2] LAS 723 LAS 723B LAS 723B	REG_{LINE}	 5 to 40 7 to 50 10 to 20	 25mA	0-125°C		 0.020 0.008 0.020	$\%V_O/V$[3]
Load Regulation[2]	$REG_{(LOAD)}$		1 to 25mA 1 to 100 mA	0-125°C		0.05 0.15	$\%V_O$
Quiescent Current	I_Q	40[4]		25°C		4.2	mA
Reference Voltage	V_{REF}			25°C	2.375	2.625	Volts
Reference Output Current	I_{REF}			25°C		3	mA
Temperature Coefficient	T_C			0-125°C		0.015	$\%V_O/°C$[5]
Ripple Attenuation[6] LAS 723 LAS 723B	R_A	10V + $1V_{RMS}$		0-125°C	 60 69		dB
Output Noise Voltage[7]	V_N			0-125°C		50	μV_{rms}
Current Limit Sense Voltage[8]	V_S			25°C	0.62	0.74	Volts
Error Amplifier Voltage Gain	A_V			25°C	4000		

(1) $V_O = V_{REF}(1 + R_1/R_2)$
R_1 = Resistance from output to inverting input
R_2 = Resistance from inverting input to common
(2) Instantaneous measurement; average chip temperature changes must be accounted for separately.
(3) Percentage times V_O per volt change in V_{IN}
(4) V_{IN} = 50 Volts for LAS723B
(5) Percentage times V_O per °C change in temperature
(6) Ripple attenuation is specified for a $1V_{RMS}$, 120Hz input ripple. Ripple attenuation is a minimum of 60dB (LAS 723) or 69dB (LAS 723B) at a 5V output, and is 1dB less for each volt increase in the output voltage.
(7) BW = 10 Hz – 100 kHz
(8) R_{SC} = 1 KΩ

TYPICAL APPLICATIONS

BASIC POSITIVE REGULATOR



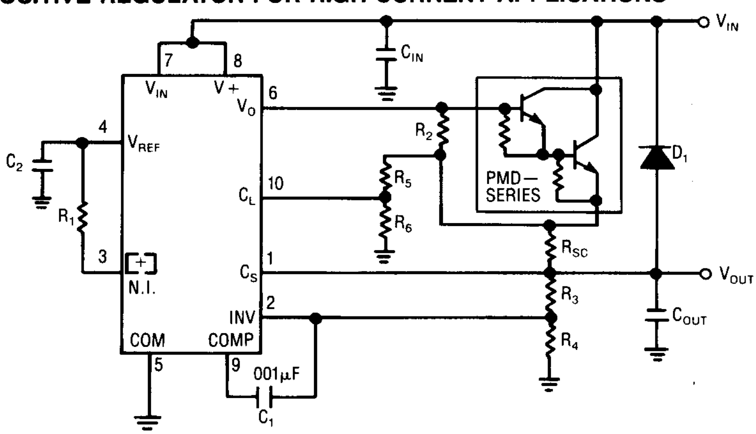
$$V_O = V_{REF}\left(1 + \frac{R_1}{R_2}\right)$$

R_3 will minimize drift

$$I_L = \frac{V_S}{R_{SC}}$$

$$R_3 = \frac{R_1 R_2}{R_1 + R_2}$$

BASIC POSITIVE REGULATOR FOR HIGH CURRENT APPLICATIONS



$$V_O = V_{REF}\left(1 + \frac{R_3}{R_4}\right)$$

$$R_1 = \frac{R_3 R_4}{R_3 + R_4}$$

V_S = Sense Voltage

I_K = Maximum output current (Knee current)

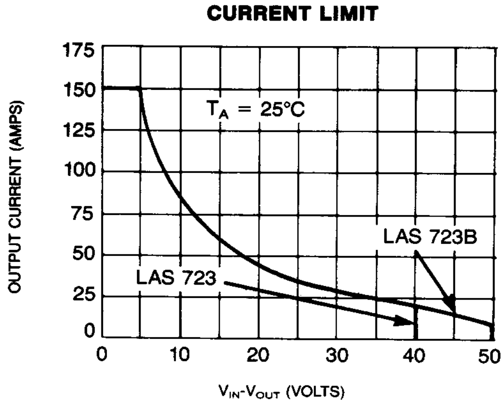
$$I_{SC} = \frac{V_S}{R_{SC}}\left(1 + \frac{R_5}{R_6}\right)$$

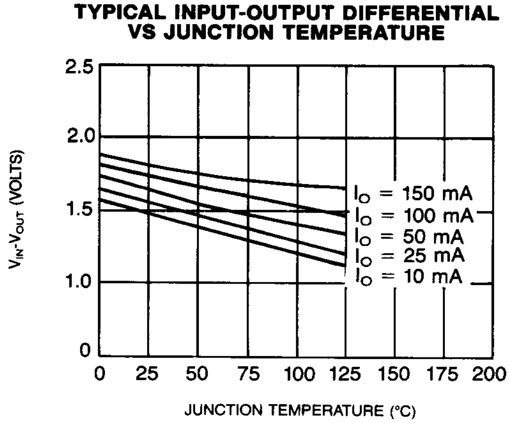
I_{SC} = Short circuit current

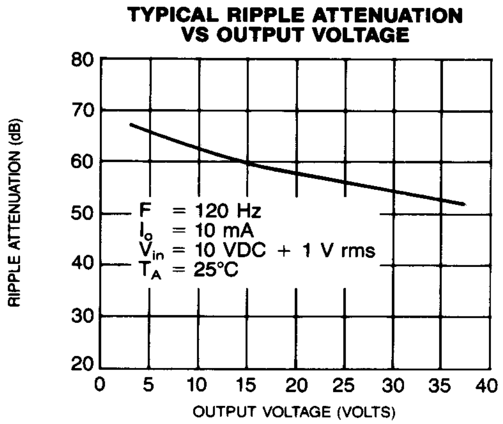
$$I_K = I_{SC} + \frac{V_O}{R_{SC}}\left(\frac{R_5}{R_6}\right), \text{ where } \frac{R_5 R_6}{R_5 + R_6} \leq 100$$

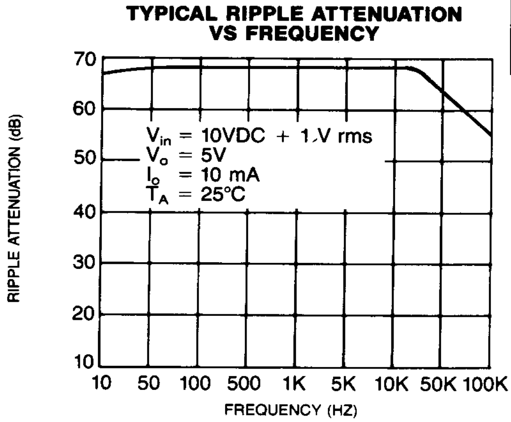
R_1 will minimize drift

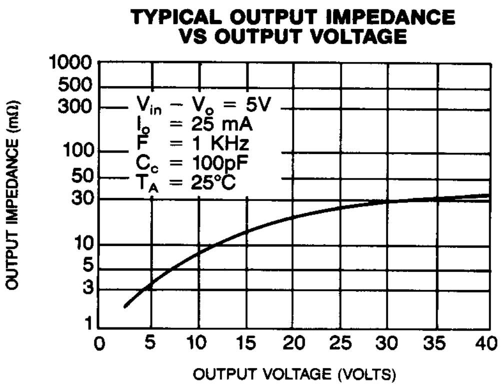
OPERATIONAL DATA

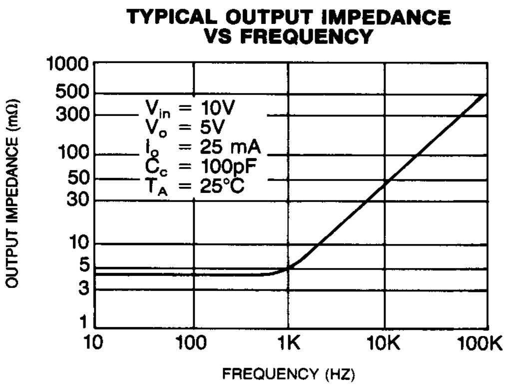




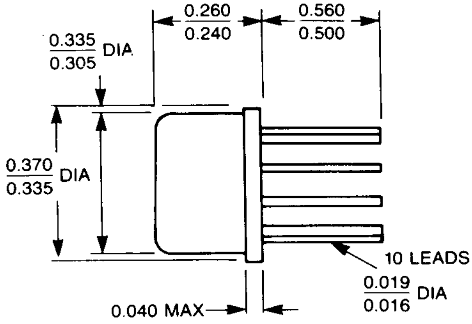


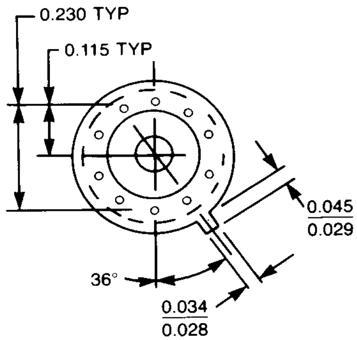


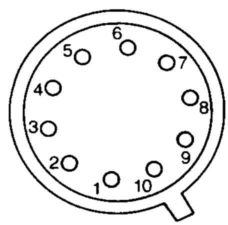




DEVICE OUTLINE







Bottom View

1 – Current Sense
2 – V_{REG} Inverting Input
3 – V_{REG} Non-Inverting Input
4 – V_{REF} Output
5 – Common
6 – Output
7 – Input
8 – +V
9 – Frequency Compensation
10 – Current Limit

NOTE: All dimensions are in inches.