

μ A723/723C/SA723C Precision Voltage Regulator

Product Specification

Linear Products

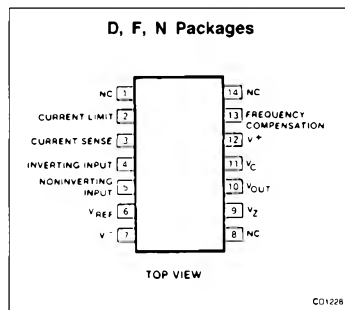
DESCRIPTION

The μ A723/SA723C is a monolithic precision voltage regulator capable of operation in positive or negative supplies as a series, shunt, switching, or floating regulator. The 723 contains a temperature-compensated reference amplifier, error amplifier, series pass transistor, and current limiter, with access to remote shutdown.

FEATURES

- Positive or negative supply operation
- Series, shunt, switching, or floating operation
- 0.01% line and load regulation
- Output voltage adjustable from 2V to 37V
- Output current to 150mA without external pass transistor
- μ A723 MIL-STD-883A, B, C available

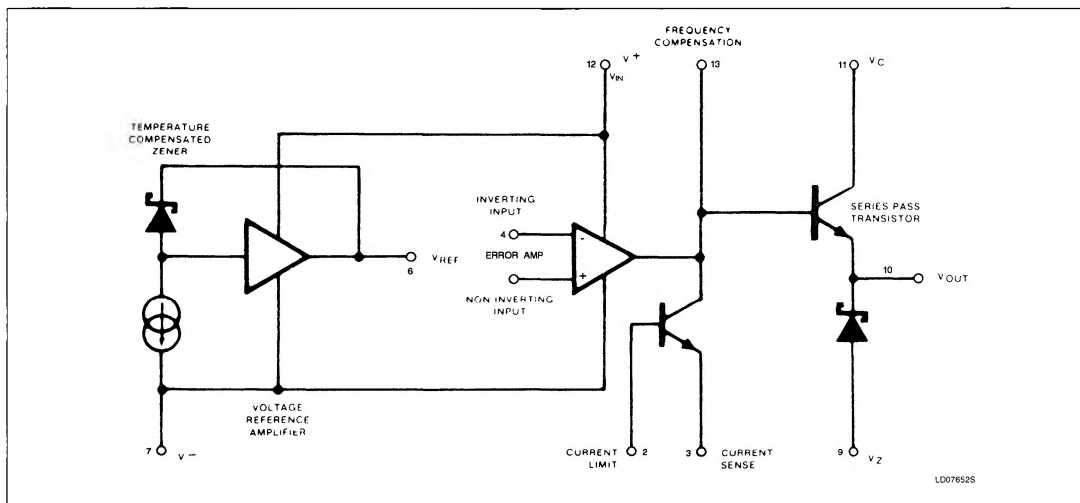
PIN CONFIGURATION



ORDERING INFORMATION

DESCRIPTION	TEMPERATURE RANGE	ORDER CODE
14-Pin Ceramic DIP	-55°C to +125°C	μ A723F
14-Pin Plastic DIP	-55°C to +125°C	μ A723N
14-Pin Plastic DIP	-40°C to +85°C	SA723CN
14-Pin Ceramic DIP	0 to 70°C	μ A723CF
14-Pin Plastic DIP	0 to 70°C	μ A723CN
14-Pin Plastic SO	0 to 70°C	μ A723CD

EQUIVALENT CIRCUIT



Precision Voltage Regulator

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ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER	RATING	UNIT
	Pulse voltage from V+ to V- (50ms)	50	V
	Continuous voltage from V+ to V-	40	V
	Input-output voltage differential	40	V
V _{DIFF}	Error amplifier maximum input differential voltage	± 5	V
V _{CM}	Error amplifier non-inverting input (Pin 5) to -V (Pin 7)	8	V
I _{OUT}	Maximum output current	150	mA
	Current from V _{REF}	15	mA
	Current from V _Z	25	mA
P _{MAX}	Maximum power dissipation T _A = 25°C (still-air) ¹		
	F package	1190	mW
	N package	1420	mW
	D package	1040	mW
T _A	Operating ambient temperature range		
	μ A723	-55 to	°C
	μ A723C	+ 125	°C
	SA723C	0 to 70	°C
		-40 to +85	
T _{STG}	Storage temperature range	-65 to + 150	°C
T _{SOLD}	Lead soldering temperature (10sec max)	300	°C

NOTE:

1. The following derating factors should be applied above 25°C:

F package at 9.5mW/°C
 N package at 11.4mW/°C
 D package at 8.3mW/°C

Precision Voltage Regulator

 μ A723/723C/SA723CDC ELECTRICAL CHARACTERISTICS $T_A = 25^\circ\text{C}$, unless otherwise specified.¹

SYMBOL	PARAMETER	TEST CONDITIONS	μ A723			μ A723C/SA723C			UNIT
			Min	Typ	Max	Min	Typ	Max	
$V_{R\text{ LINE}}$	Line regulation ²	$V_{IN} = 12\text{V}$ to $V_{IN} = 15\text{V}$ $V_{IN} = 12\text{V}$ to $V_{IN} = 40\text{V}$		0.01 0.02	0.1 0.2		0.01 0.1	0.1 0.5	% V_{OUT} % V_{OUT}
$V_{R\text{ LOAD}}$	Load regulation ²	$I_L = 1\text{mA}$ to $I_L = 50\text{mA}$		0.03	0.15		0.03	0.2	% V_{OUT}
$\Delta V_{IN}/\Delta V_O$	Ripple Rejection	$f = 50\text{Hz}$ to 10kHz , $C_{REF} = 0$		74			74		dB
		$f = 50\text{Hz}$ to 10kHz , $C_{REF} = 5\mu\text{F}$		86			86		dB
I_{OS}	Short-circuit current	$R_{SC} = 10\Omega$, $V_{OUT} = 0$		65			65		mA
V_{REF}	Reference voltage	$I_{REF} = 0.1\text{mA}$	6.95	7.15	7.35	6.80	7.15	7.50	V
$V_{REF\text{ (LOAD)}}$	Reference voltage change with load	$I_{REF} = 0.1\text{mA}$ to 5mA			20			20	mV
V_{NOISE}	Output noise voltage	$BW = 100\text{Hz}$ to 10kHz , $C_{REF} = 0$ $BW = 100\text{Hz}$ to 10kHz , $C_{REF} = 5\mu\text{F}$		20 2.5			20 2.5		μVRMS μVRMS
S	Long-term stability	$T_j = T_{j\text{max}}$, $T_A = 25^\circ\text{C}$ for end point measurement		0.1			0.1		%1000 hrs.
I_{SCD}	Standby current drain	$I_L = 0$, $V_{IN} = 30\text{V}$		2.3	3.5		2.3	4.0	mA
V_{IN}	Input voltage range		9.5		40	9.5		40	V
V_{OUT}	Output voltage range		2.0		37	2.0		37	V
V_{DIFF}	Input-output voltage differential		3.0		38	3.0		38	V
The following specifications apply over the operating temperature ranges.									
$V_{R\text{ LINE}}$	Line regulation	$V_{IN} = 12\text{V}$ to $V_{IN} = 15\text{V}$			0.3			0.3	% V_{OUT}
$V_{R\text{ LOAD}}$	Load regulation	$I_L = 1\text{mA}$ to $I_L = 50\text{mA}$			0.6			0.6	% V_{OUT}
TC	Average temperature coefficient of output voltage			0.002	0.015		0.003	0.015	%/ $^\circ\text{C}$

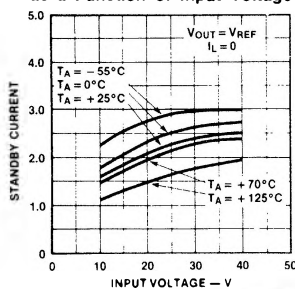
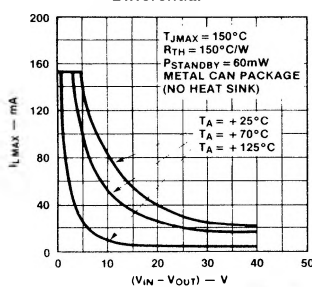
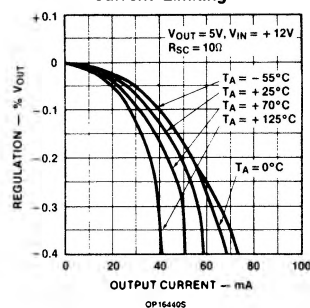
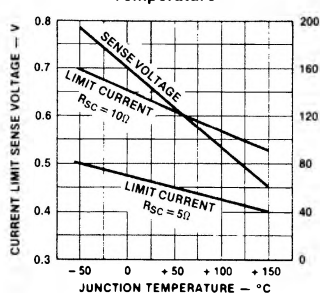
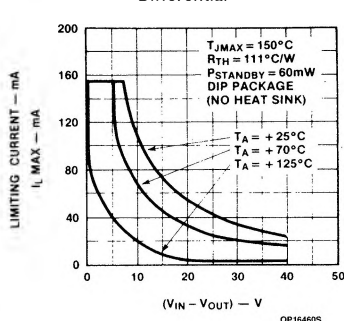
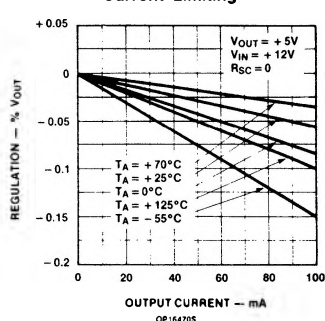
NOTES:

- $V_{IN} = V^+ = V_C = 12\text{V}$, $V^- = 0\text{V}$, $V_{OUT} = 5\text{V}$, $I_L = 1\text{mA}$, $R_{SC} = 0$, $C_1 = 100\text{pF}$, $C_{REF} = 0$ and divider impedance as seen by error amplifier $\leq 10\text{k}\Omega$.
- The load and line regulation specifications are for constant junction temperature. Temperature drift effects must be taken into account separately when the unit is operating under conditions of high dissipation.

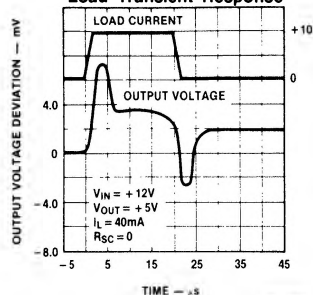
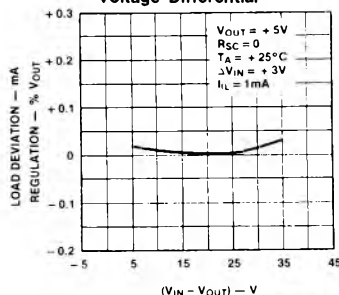
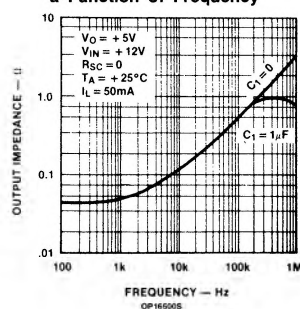
Precision Voltage Regulator

 $\mu A723/723C/SA723C$

TYPICAL PERFORMANCE CHARACTERISTICS

Standby Current Drain
as a Function of Input VoltageMaximum Load Current
as a Function of
Input-Output Voltage
DifferentialLoad Regulation
Characteristics with
Current LimitingCurrent Limiting
Characteristics as a
Function of Junction
TemperatureMaximum Load Current
as a Function of
Input-Output Voltage
DifferentialLoad Regulation
Characteristics Without
Current Limiting

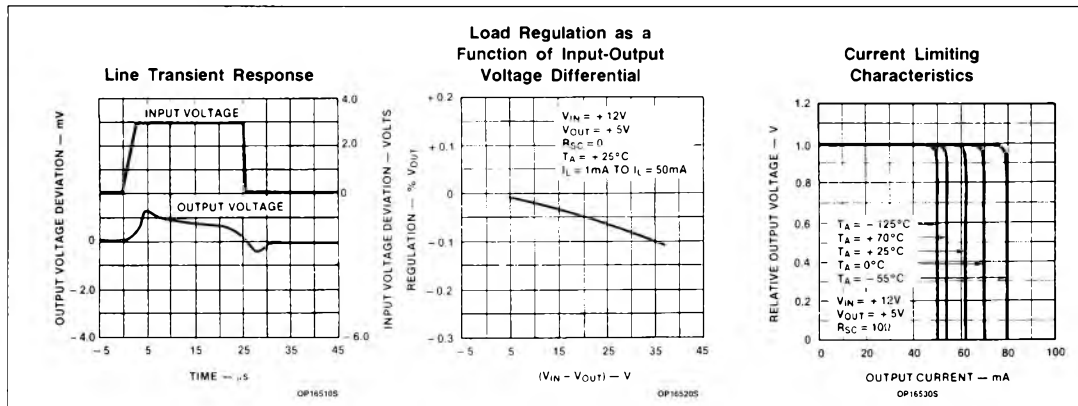
Load Transient Response

Line Regulation as a
Function of Input-Output
Voltage DifferentialOutput Impedance as
a Function of Frequency

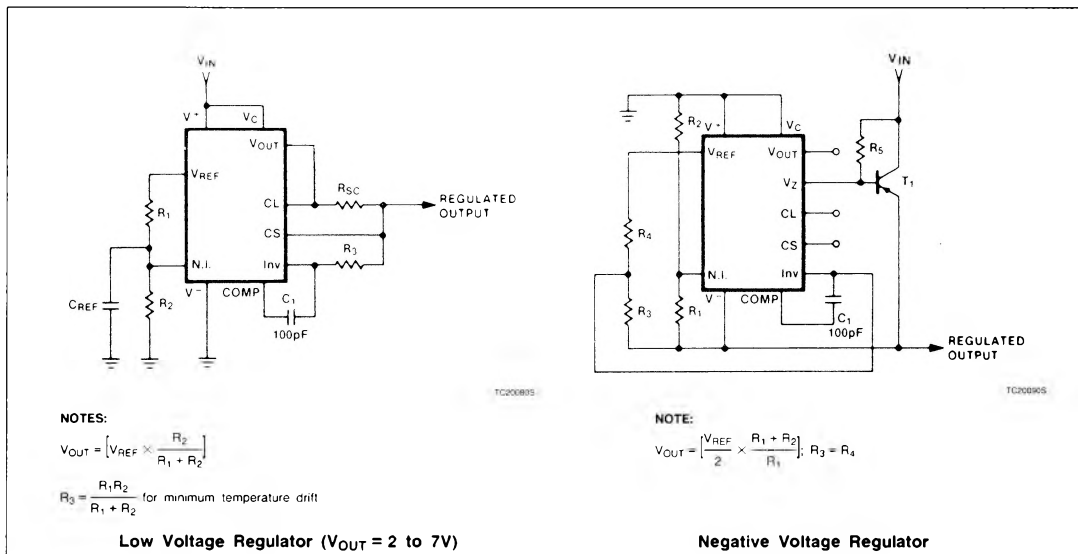
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TYPICAL PERFORMANCE CHARACTERISTICS (Continued)



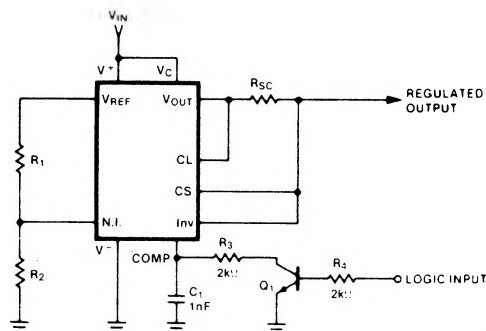
TYPICAL APPLICATIONS



Precision Voltage Regulator

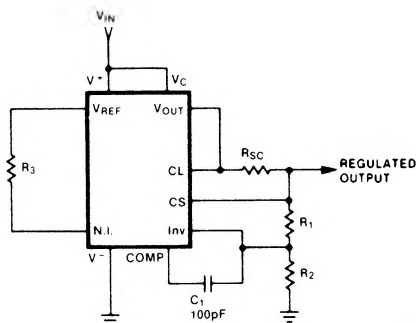
 $\mu A723/723C/SA723C$

TYPICAL APPLICATIONS (Continued)



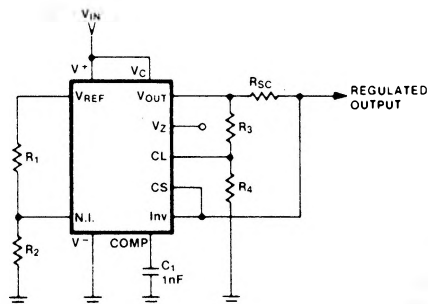
TC201005

NOTE:
 $V_{OUT} = \left[V_{REF} \times \frac{R_2}{R_1 + R_2} \right]$

Remote Shutdown Regulator With Current Limiting ($V_{OUT} = 2$ to $7V$)

TC201105

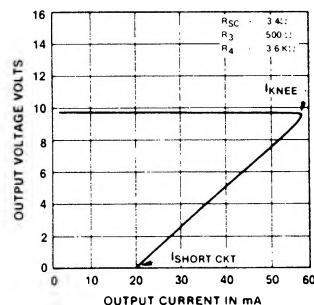
NOTES:
 $V_{OUT} = \left[V_{REF} \times \frac{R_1 + R_2}{R_2} \right]; R_3 = R_4$
 $R_3 = \frac{R_1 R_2}{R_1 + R_2}$ for minimum temperature drift
 R_3 may be eliminated for minimum component count

High Voltage Regulator ($V_{OUT} = 7$ to $37V$)

TC201205

NOTES:
 $I_{KNEE} = \left[\frac{V_{OUT} R_3}{R_{SC} R_4} + \frac{V_{SENSE} (R_3 + R_4)}{R_{SC} R_4} \right]$
 $V_{OUT} = \left[V_{REF} \times \frac{R_1 + R_2}{R_2} \right]$
 $I_{SHORT\ CKT} = \left[\frac{V_{SENSE}}{R_{SC}} \times \frac{R_3 + R_4}{R_4} \right]$

NOTES:
 $\frac{R_4}{R_3} = \frac{V_{OUT\ I_{SC}}}{V_{SENSE}(I_{KNEE} - I_{SHORT\ CKT})} - 1$
 $R_{SC} = \frac{V_{SENSE}}{I_{SC}} \left[1 + \frac{R_3}{R_4} \right]$



OP165405

Foldback Current Limiting Regulator ($V_{OUT} = 2$ to $7V$)