

# THOMSON SEMICONDUCTORS

T-58-11-23  
**UA723**  
**UA723A**

78C 06262 D

## PRECISION ADJUSTABLE POSITIVE VOLTAGE REGULATORS

The UA723,A is a monolithic voltage regulator constructed on a single silicon chip. The device consists of a temperature compensated reference amplifier, error amplifier, power series pass transistor and current limit circuitry. Additional NPN or PNP pass elements may be used when output currents exceeding 150 mA are required. Provisions are made for adjustable current limiting and remote shut down. In addition to the above the device features low standby current drain, low temperature drift and high ripple rejection. Applications include laboratory power supplies, airborne systems and other power supplies for digital and linear circuits.

- Positive or negative supply operation.
- Series, shunt, switching or floating operation.
- 0.01% line regulation.
- Output voltage adjustable from 2 to 37 volts.
- Output current up to 150 mA without external pass transistor.

### ORDERING INFORMATION

Hi-Rel versions available - See chapter 14

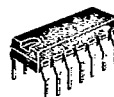
PART NUMBER	TEMPERATURE RANGE	PACKAGE			
		H	DP	FP	DG
UA723C	0°C to + 70°C	•	•	•	•
UA723I	-25°C to + 85°C	•	•	•	•
UA723M	-55°C to + 125°C	•	•	•	•
UA723AC	0°C to + 70°C	•	•	•	•
UA723AM	-55°C to + 125°C	•	•	•	•

Examples : UA723CH, UA723CDP, UA723CFP, UA723CDG

## PRECISION ADJUSTABLE POSITIVE VOLTAGE REGULATORS

### CASES

CB-2  
(TO-116)



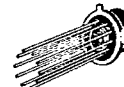
CB-511  
(SO-14)



DP SUFFIX  
PLASTIC PACKAGE  
DG SUFFIX  
CERDIP PACKAGE

FP SUFFIX  
PLASTIC  
MICROPACKAGE

CB-3  
(TO-100)

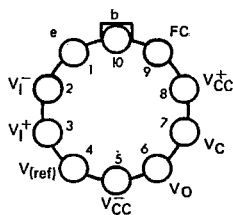


H SUFFIX  
METAL CAN

### PIN ASSIGNMENTS

(Bottom view)

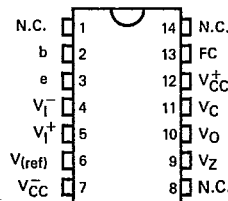
CB-3



Pin 5 is connected to case.

(Top view)

CB-2 - CB-511



**THOMSON SEMICONDUCTORS**  
 Sales headquarters  
 45, av. de l'Europe - 78140 VELIZY - FRANCE  
 Tel. : (3) 946 97 19 / Telex : 204780 F

**THOMSON**  
 COMPONENTS

UA723.A

T-58-11-23

78C 06263

D

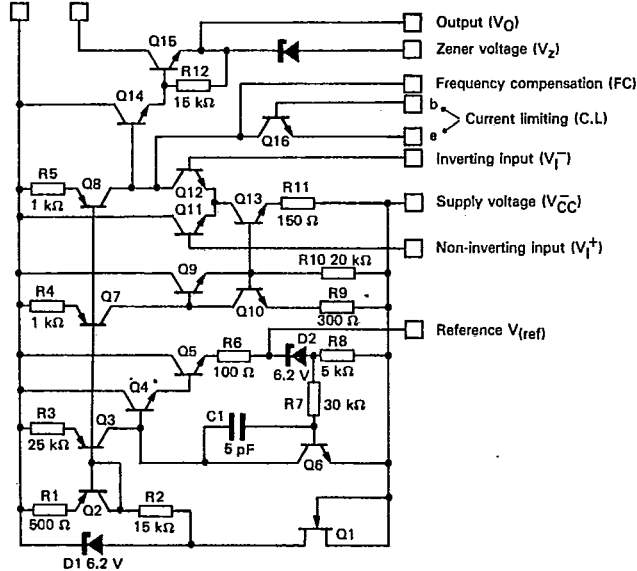
MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Input voltage (Both Inputs)	$V_I$	40	V
Pulse voltage from $V_{CC}^+$ to $V_{CC}^-$ (50 ms)	$V_I(\text{pulse})$	50	V
Input-output voltage differential	$V_I - V_O$	38	V
Output current	$I_O$	150	mA
Operating junction temperature range	$T_{oper}$	0 to + 70 -55 to + 125 -25 to + 85	$^{\circ}\text{C}$
Storage temperature range	$T_{stg}$	-65 to + 150	$^{\circ}\text{C}$
Internal power dissipation	$P_D$	500	mW

THERMAL CHARACTERISTICS

Rating	Symbol	Value	Unit
Maximum junction-case thermal resistance	$R_{th(j-c)}$	45 60 25	$^{\circ}\text{C}/\text{W}$
Maximum junction-ambient thermal resistance	$R_{th(j-a)}$	185 150 100	$^{\circ}\text{C}/\text{W}$
Junction ceramic-substrate (Case glued to substrate)	CB-511	90	$^{\circ}\text{C}/\text{W}$
Junction ceramic-substrate (Case glued to substrate, substrate temperature maintained constant)	CB-511	65	$^{\circ}\text{C}/\text{W}$

Supply voltage ( $V_{CC}^+$ ) ( $V_C$ ) Collector voltage SCHEMATIC DIAGRAM



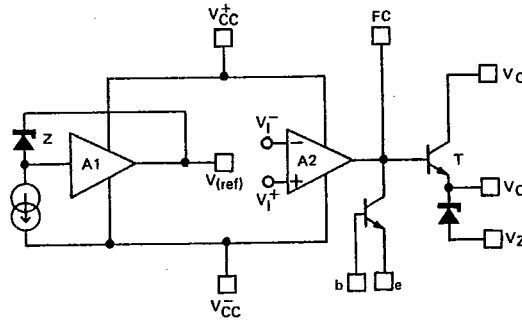
CASE	$V_I^-$	$V_I^+$	$V_{(ref)}$	$V_{CC}^-$	$V_{CC}^+$	$V_Z$	$V_O$	F.C.	C.L.	$V_C$	N.C.
CB-3	2	3	4	5	8	-	6	9	1, 10	7	-
CB-2, CB-511	4	5	6	7	12	9	10	13	2, 3	11	1, 8, 14

UA723,A

78C 06264 D

T-58-11-23

EQUIVALENT CIRCUIT



- Z : Temperature compensated zener
- A1 : Voltage reference amplifier
- A2 : Error amplifier
- T : Series pass transistor

ELECTRICAL CHARACTERISTICS

Unless otherwise specified,  $T_{amb} = +25^{\circ}C$ ,  $V_I = V_{CC}^+ = V_C = +12V$ ,  $V_{CC}^- = 0$ ,  $V_O = +5V$ ,  $I_C = 1mA$ ,  $R_{SC} = 0$ ,  $C_1$  (compensation) = 100 pF and divider impedance as seen by error amplifier  $\leq 10k\Omega$ .

Line and load regulation specifications are given for the condition of constant chip temperature. Temperature drifts must be taken into account separately for high dissipation conditions.

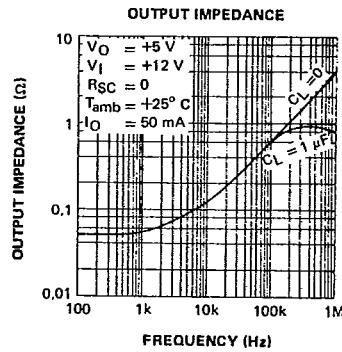
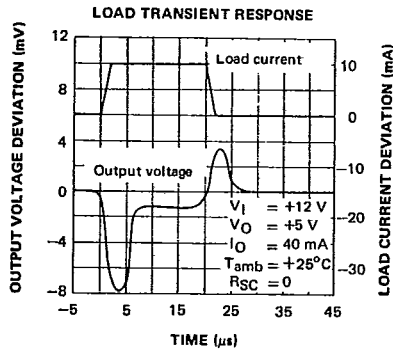
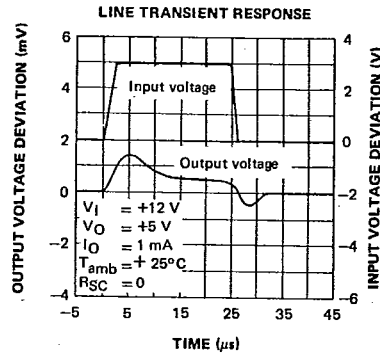
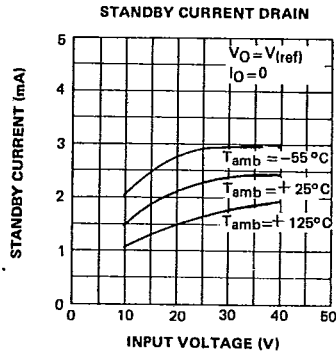
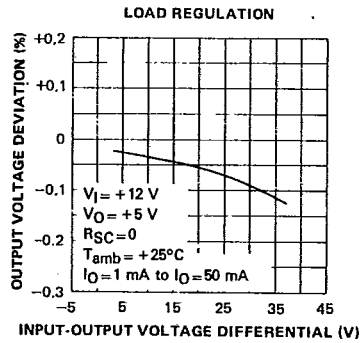
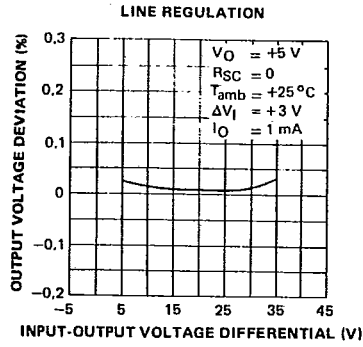
Characteristic	Symbol	UA723M			UA723C, I			Unit
		Min	Typ	Max	Min	Typ	Max	
Input voltage range	$V_I$	9.5	—	40	9.5	—	40	V
Output voltage range	$V_O$	2	—	37	2	—	37	V
Input-output voltage differential	$V_I - V_O$	3	—	38	3	—	38	V
Line regulation $T_{amb} = +25^{\circ}C$ , $+12V \leq V_I \leq +15V$ $+12V \leq V_I \leq +40V$ $T_{min} \leq T_{amb} \leq T_{max}$ , $+12V \leq V_I \leq +15V$	$K_{VI}$	—	0.01 0.02	0.1 0.2 0.3	—	0.01 0.1	0.1 0.5 0.3	%/V <sub>O</sub>
Load regulation (1 mA $\leq I_O \leq 50$ mA) $T_{amb} = +25^{\circ}C$ $T_{min} \leq T_{amb} \leq T_{max}$	$K_{VO}$	—	0.03	0.15 0.6	—	0.03	0.2 0.6	%/V <sub>O</sub>
Ripple rejection (50 Hz $\leq f \leq 10$ kHz) $C_{(ref)} = 0$ $C_{(ref)} = 5 \mu F$	$R_{vf}$	—	74 86	—	—	74 86	—	dB
Standby current drain ( $I_O = 0$ , $V_I = +30V$ )	$I_{IB}$	—	2.3	3.5	—	2.3	4	mA
Reference voltage	$V_{(ref)}$	6.95	7.15	7.35	6.8	7.15	7.5	V
Short-circuit current ( $R_{SC} = 10 \Omega$ , $V_O = 0$ )	$I_{SC}$	—	65	—	—	65	—	mA
Output noise voltage (100 Hz $\leq f \leq 10$ kHz) $C_{(ref)} = 0$ $C_{(ref)} = 5 \mu F$	$V_{NO}$	—	20 2.5	—	—	20 2.5	—	$\mu V_{rms}$
Average temperature coefficient of output voltage $T_{min} \leq T_{amb} \leq T_{max}$	$\alpha_{VO}$	—	0.002	0.015	—	0.003	0.015	%/°C
Long term stability	$K_{VH}$	—	0.05 0.1	0.2	—	0.05 0.1	0.2	%/1000 H

UA723,A

7-58-11-23

78C 06265

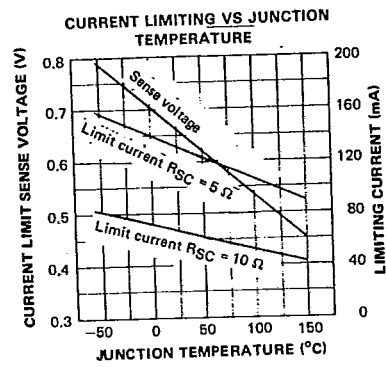
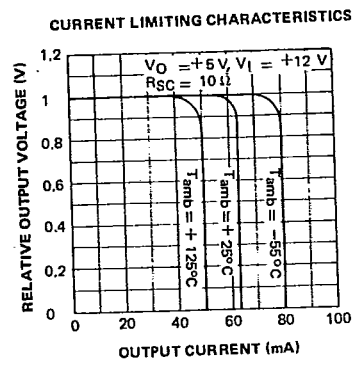
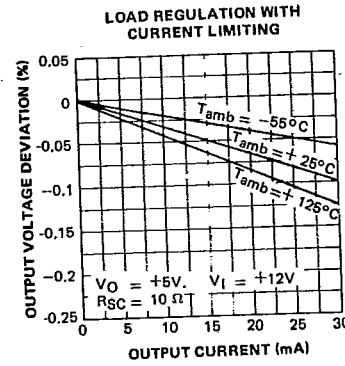
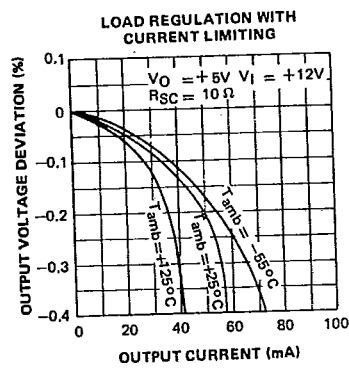
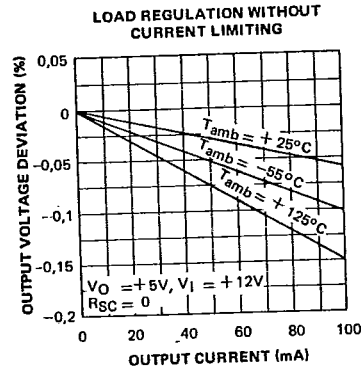
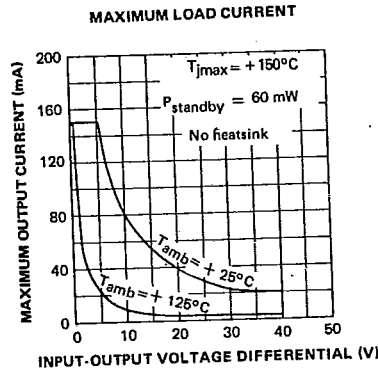
D



UA723,A

78C 06266 D

T-58-11-23



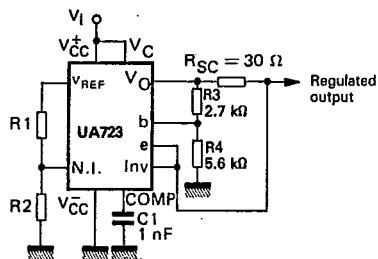
UA723,A

78C 06267 D

BASIC CIRCUITS

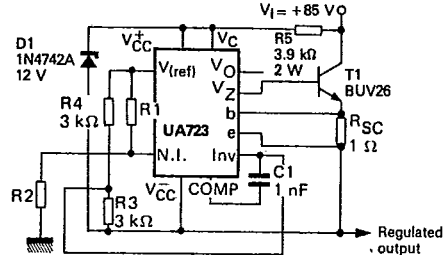
T-58-11-23

FOLDBACK CURRENT LIMITING



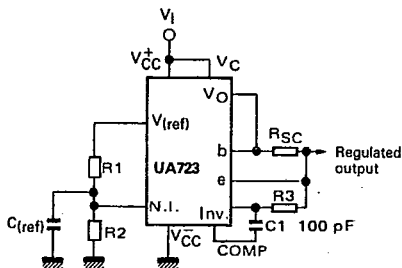
Regulated output voltage	+ 5 V
Line regulation ( $\Delta V_I = 3 \text{ V}$ )	0.5 mV
Load regulation ( $\Delta I_L = 10 \text{ mA}$ )	1 mV
Short-circuit current	20 mA

POSITIVE FLOATING REGULATOR



Regulated output voltage	+ 60 V
Line regulation ( $\Delta V_I = 20 \text{ V}$ )	15 mV
Load regulation ( $\Delta I_L = 50 \text{ mA}$ )	20 mV

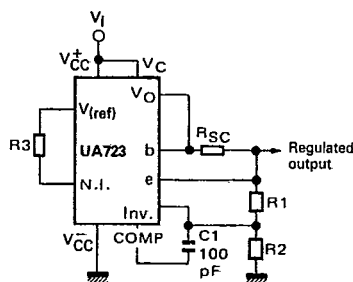
BASIC LOW VOLTAGE REGULATOR  
( $V_O = 2$  to  $7 \text{ V}$ )



Regulated output voltage	5 V
Line regulation ( $\Delta V_I = 3 \text{ V}$ )	0.5 mV
Load regulation ( $\Delta I_L = 50 \text{ mA}$ )	1.5 mV

NOTE 3 :  $R_3 = \frac{R_1 R_2}{R_1 + R_2}$  for minimum temperature drift

BASIC HIGH VOLTAGE REGULATOR  
( $V_O = 7$  to  $37 \text{ V}$ )



Regulated output voltage	15 V
Line regulation ( $\Delta V_I = 3 \text{ V}$ )	1.5 mV
Load regulation ( $\Delta I_L = 50 \text{ mA}$ )	4.5 mV

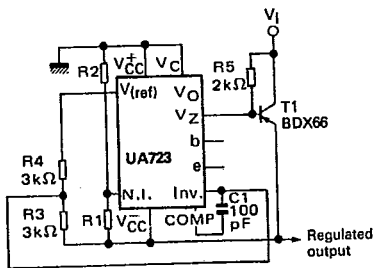
NOTE :  $R_3 = \frac{R_1 R_2}{R_1 + R_2}$  for minimum temperature drift

R3 may be eliminated for minimum component count

UA723,A

T-58-11-23  
78C 06268 D

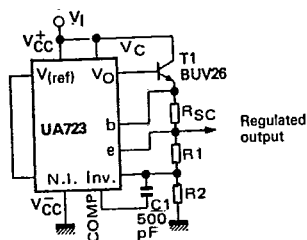
**NEGATIVE VOLTAGE REGULATOR (Note 1)**



Regulated output voltage	-15 V
Line regulation ( $\Delta V_I = 3 V$ )	1 mV
Load regulation ( $\Delta I_L = 100 \text{ mA}$ )	2 mV

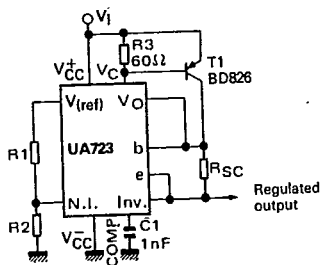
Note 1 : For applications using TO-100 metal cans,  $V_Z$  can be implemented externally by connecting a 6.2 V zener diode to  $V_0$  pin.

**POSITIVE VOLTAGE REGULATOR (External NPN Pass Transistor)**



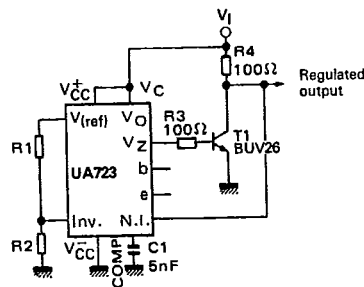
Regulated output voltage	+15 V
Line regulation ( $\Delta V_I = 3 V$ )	1.5 mV
Load regulation ( $\Delta I_L = 1 A$ )	15 mV

**POSITIVE VOLTAGE REGULATOR (External PNP Pass Transistor)**



Regulated output voltage	+5 V
Line regulation ( $\Delta V_I = 3 V$ )	0.5 mV
Load regulation ( $\Delta I_L = 1 A$ )	5 mV

**SHUNT REGULATOR**

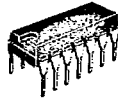
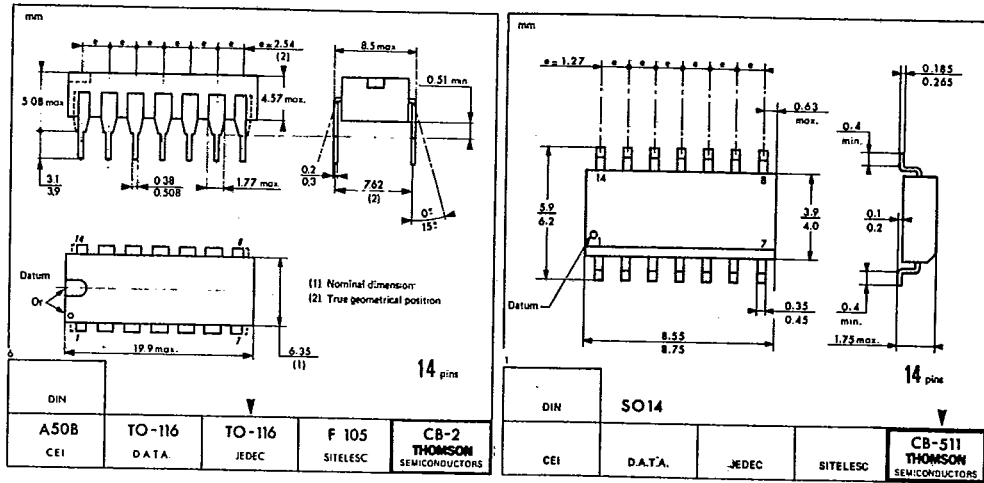


Regulated output voltage	+5 V
Line regulation ( $\Delta V_I = 10 V$ )	0.5 mV
Load regulation ( $\Delta I_L = 100 \text{ mA}$ )	1.5 mV

UA723,A

78C 06269 D

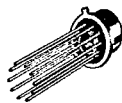
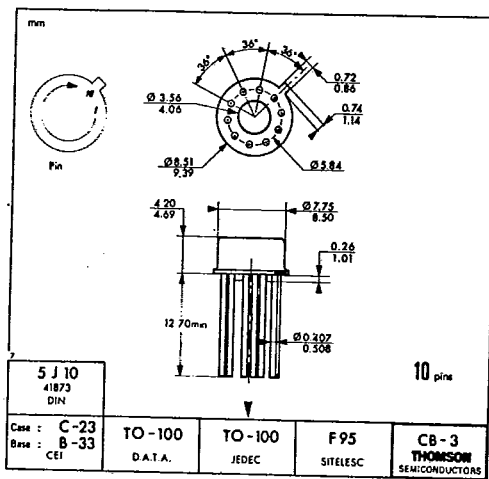
T-58-11-23



CB-2  
DP SUFFIX  
PLASTIC PACKAGE  
DG SUFFIX  
CERDIP PACKAGE



CB-511  
FP SUFFIX  
PLASTIC MICROPACKAGE



CB-3  
H SUFFIX  
METAL CAN

These specifications are subject to change without notice.  
Please inquire with our sales offices about the availability of the different packages.