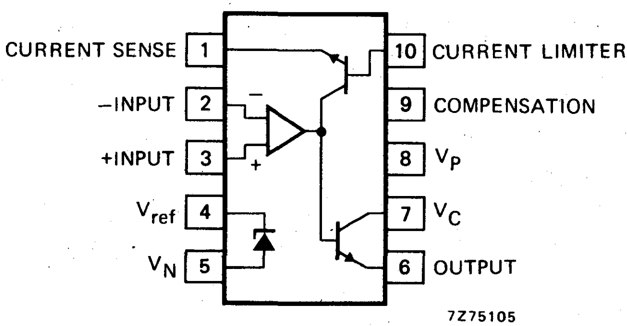
PRECISION VOLTAGE REGULATOR

The TDA0723D is a monolithic precision voltage regulator. The circuit is equivalent to the μA723C, however it is mounted in a miniature plastic package suitable for hybrid circuits or other miniaturized applications.
The circuit contains a temperature compensated reference amplifier, an error amplifier, a power series pass transistor and a current limiting circuit with access to remote shut down.
The device can be used with positive or negative supply voltages as a series, shunt, switching or floating regulator.

Features

- Positive and negative supply operation.
- Line and load regulation
- Temperature coefficient of the output voltage: typ. 0,003 % per ^{o}C
- Input voltage range: 9,5 to 40 V
- Output voltage range: 2 to 37 V
- Operating ambient temperature: −25 to +85 ^{o}C
- Miniature plastic encapsulation.

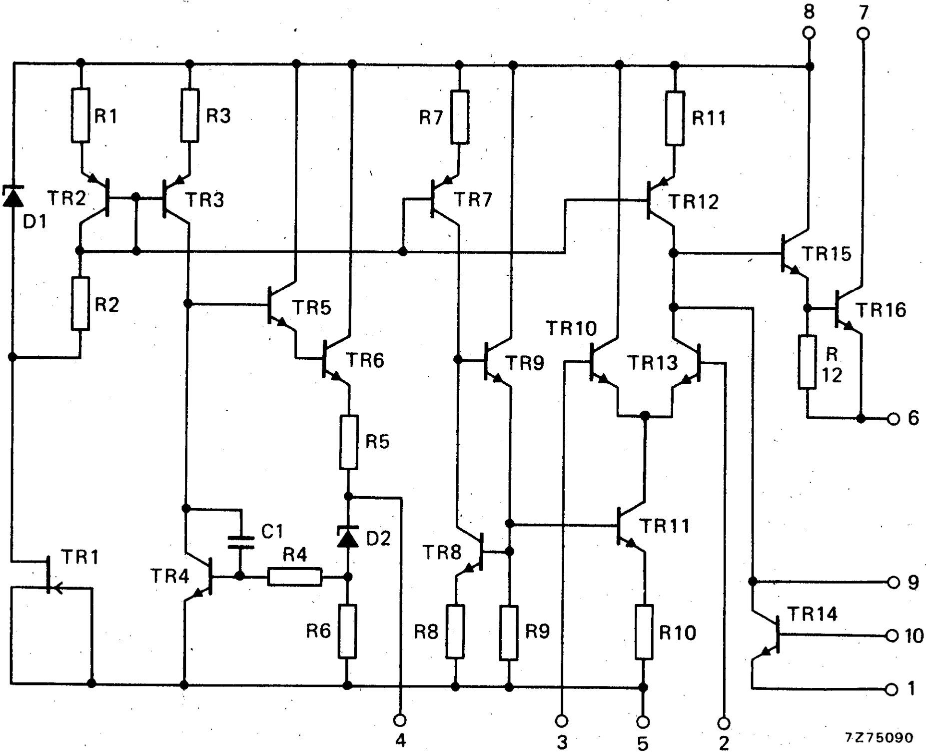
CONNECTION DIAGRAM



PACKAGE OUTLINE (see general section)

SO-10; plastic 10-lead flat pack.

CIRCUIT DIAGRAM



RATINGS Limiting values in accordance with the Absolute Maximum System (IEC134)

Input collector voltage (pin 7)	V_C	max.	40	V
Supply voltage	V_P	max.	40	V
Input-output voltage difference	V_{7-6}	max.	40	V
Output current	I_6	max.	150	mA
Current from reference output	I_4	max.	15	mA

Temperatures

Operating ambient temperature	T_{amb}	−25 to +85	^oC
Storage temperature	T_{stg}	−65 to +125	^oC
Junction temperature	T_j	max. 125	^oC

RATINGS (continued)

Power dissipation in free air; T_{amb} = 50 °C

Mounted on a ceramic substrate of 4 cm^2	P_{tot}	max.	485 mW
derating factor for T_{amb} > 50 °C	$1/R_{th}$	=	6,5 mW/°C
Mounted on PC board of 4 cm^2	P_{tot}	max.	335 mW
derating factor for T_{amb} > 50 °C	$1/R_{th}$	=	4,5 mW/°C

CHARACTERISTICS at $V_i = V_P = V_C$ = 12 V; $-V_N$ = 0 V; I_L = 5 mA; R_{sc} = 0; C = 100 pF; C_{ref} = 0; Tamb = 25 °C unless otherwise specified

Parameter	Conditions	Symbol	min.	typ.	max.	Unit
Line regulation [1]	V_i = 12 to 15 V		–	0,01	0,1	$\%V_o$
	V_i = 12 to 40 V		–	0,1	0,5	$\%V_o$
Load regulation [1]	I_L = 1 to 50 mA		–	0,03	0,2	$\%V_o$
Ripple rejection	f = 50 Hz to 10 kHz					
	C_{ref} = 0		–	74	–	dB
	C_{ref} = 5 µF		–	86	–	dB
Short-circuit current limit	R_{sc} = 10 Ω; V_o = 0		–	65	–	mA
Reference voltage		V_{ref}	6,80	7,15	7,50	V
Output noise voltage	B = 100 Hz to 10 kHz					
	C_{ref} = 0	$V_{n(rms)}$	–	20	–	µV
	C_{ref} = 5 µF	$V_{n(rms)}$	–	2,5	–	µV
Long term stability	over 1000 hours		–	0,1	–	%
Stand-by current drain	I_L = 0; V_i = 30 V		–	2,3	4,0	mA
Input voltage range		V_i	9,5	–	40	V
Output voltage range		V_o	2	–	37	V
Input-output voltage difference		V_i-V_o	3	–	38	V

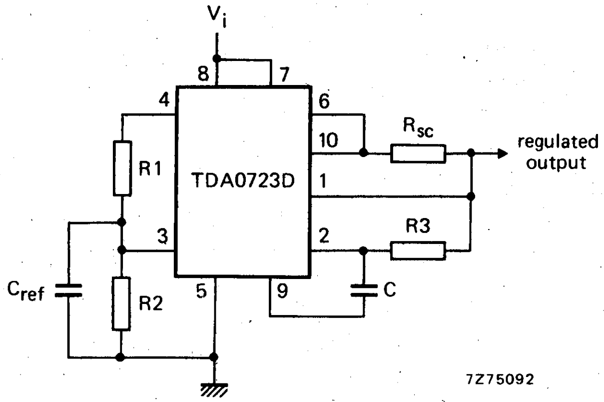
The following characteristics are at T_{amb} = 0 to +70 °C

Parameter	Conditions	Symbol	min.	typ.	max.	Unit
Line regulation	V_i = 12 to 15 V		–	–	0,3	$\%V_o$
Load regulation	I_L = 1 to 50 mA		–	–	0,6	$\%V_o$
Average temperature coefficient of output voltage			–	0,003	0,015	%/°C

[1]) The load and line regulation specifications are for a constant junction temperature. Temperature drift effects must be taken into account separately when the unit is operating under high dissipation conditions.

N.B.: For R_{sc}, C, C_{ref} see circuits on page 4.

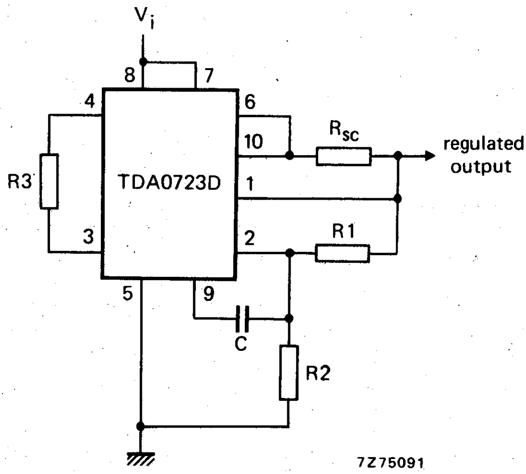
Low voltage regulator (V_O = 2 to 7 V)



$$V_O = V_{ref} \times \frac{R2}{R1+R2}$$

$R3 = \frac{R1 \cdot R2}{R1+R2}$ for minimum temperature drift.

High voltage regulator (V_O = 7 to 37 V)



$$V_O = V_{ref} \times \frac{R1+R2}{R2}$$

$R3 = \frac{R1 \cdot R2}{R1+R2}$ for minimum temperature drift

R3 may be eliminated for minimum component count.