IC 723 – GENERAL PURPOSE REGULATOR

Disadvantages of fixed voltage regulator:

1. Do not have the shot circuit protection
2. Output voltage is not adjustable

These limitations can be overcomes in IC723.

Features of IC723:

1. Unregulated dc supply voltage at the input between 9.5V & 40V
2. Adjustable regulated output voltage between 2 to 3V.
3. Maximum load current of 150 mA (I_{Lmax} = 150mA).
4. With the additional transistor used, I_{Lmax} upto 10A is obtainable.
5. Positive or Negative supply operation
6. Internal Power dissipation of 800mW.
7. Built in short circuit protection.
8. Very low temperature drift.
9. High ripple rejection.

The simplified functional block diagram can be divided in to 4 blocks.

1. Reference generating block
2. Error Amplifier
3. Series Pass transistor
4. Circuitry to limit the current

1. Reference Generating block:

The temperature compensated Zener diode, constant current source & voltage reference amplifier together from the reference generating block. The Zener diode is used to generate a fixed reference voltage internally. Constant current source will make the Zener diode to operate at affixed point & it is applied to the Non – inverting terminal of error amplifier. The Unregulated input voltage ±Vcc is applied to the voltage reference

amplifier as well as error amplifier.

Error Amplifier:

Error amplifier is a high gain differential amplifier with 2 input (inverting & Non- inverting). The Non- inverting terminal is connected to the internally generated reference voltage. The Inverting terminal is connected to the full regulated output voltage.

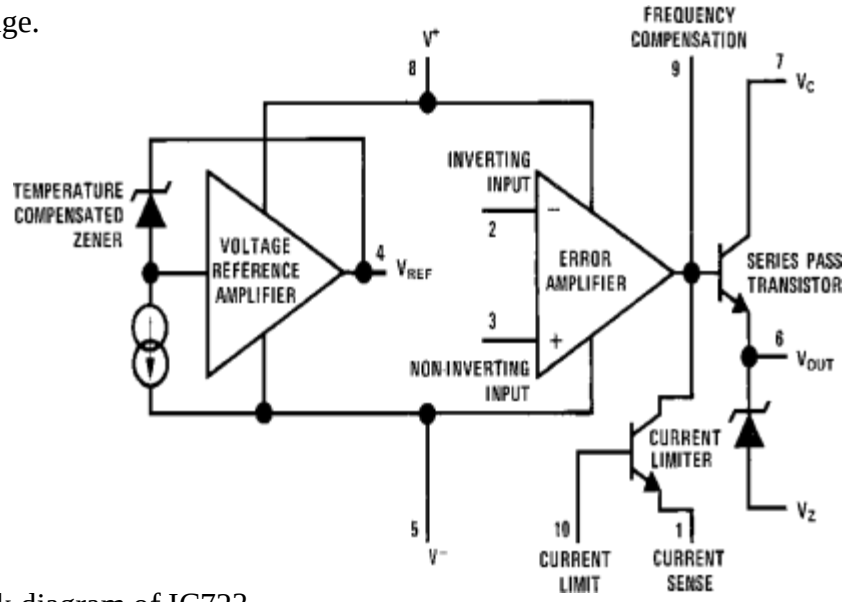

Fig: Functional block diagram of IC723

NC	1		14	NC
Current limit	2		13	Frequency compensation
Current sense	3		12	+Vcc
Inverting Input	4	IC 723	11	Vc
Non-Inverting Input	5		10	Vo
Vref	6		9	Vz
-Vcc	7		8	NC

Fig : Pin diagram of IC723

Series Pass Transistor:

Q1 is the internal series pass transistor which is driven by the error amplifier. This transistor actually acts as a variable resistor & regulates the output voltage. The collector of transistor Q1 is connected to the Un-regulated power supply. The maximum collector voltage of Q1 is limited to 36Volts. The maximum current which can be supplied by Q1 is 150mA.

Circuitry to limit the current:

The internal transistor Q2 is used for current sensing & limiting. Q2 is normally OFF transistor. It turns ON when the IL exceeds a predetermined limit.

Low voltage , Low current is capable of supplying load voltage which is equal to or between 2 to 7Volts.

Vload = 2 to 7V Iload = 150mA

IC723 as a LOW voltage LOW current :

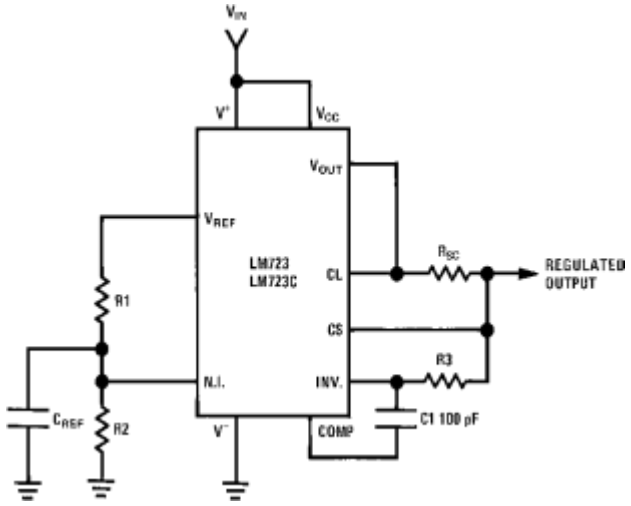

Fig: Typical circuit connection diagram

R1 & R2 from a potential divider between Vref & Gnd.

The Voltage across R2 is connected to the Non – inverting terminal of the regulator IC

Vnon-inv = R2 R1 □ R2Vref

Gain of the internal error amplifier is large

Vnon-inv = Vin

Therefore the Vo is connected to the Inverting terminal through R3 & RSC must also be equal to Vnon-inv

Vo = Vnon-inv = R2R1 □ R2 Vref

R1 & R2 can be in the range of 1 KΩ to 10KΩ & value of R3 is given by

R3 = R1ll R2 = R1R2

R □ R2

Rsc (current sensing resistor) is connected between Cs & CL. The voltage drop across Rsc is proportional to the IL.

This resistor supplies the output voltage in the range of 2 to 7 volts, but the load current can be higher than 150mA.

The current sourcing capacity is increased by including a transistor Q in the circuit.

The output voltage , Vo = R2

R1 □ R2Vref

IC723 as a HIGH voltage LOW Current:

This circuit is capable of supplying a regulated output voltage between the range of 7 to 37 volts with a maximum load current of 150 mA.

The Non – inverting terminal is now connected to Vref through resistance R3.

The value of R1 & R2 are adjusted in order to get a voltage of Vref at the inverting terminal at the desired output.

Vin = Vref = R2 Vo

R1 □ R2

R2OrVref

Vo = R1 □ R2 _____

Vo = [1 + R1] VrefR2

IC723 as a HIGH voltage HIGH Current:

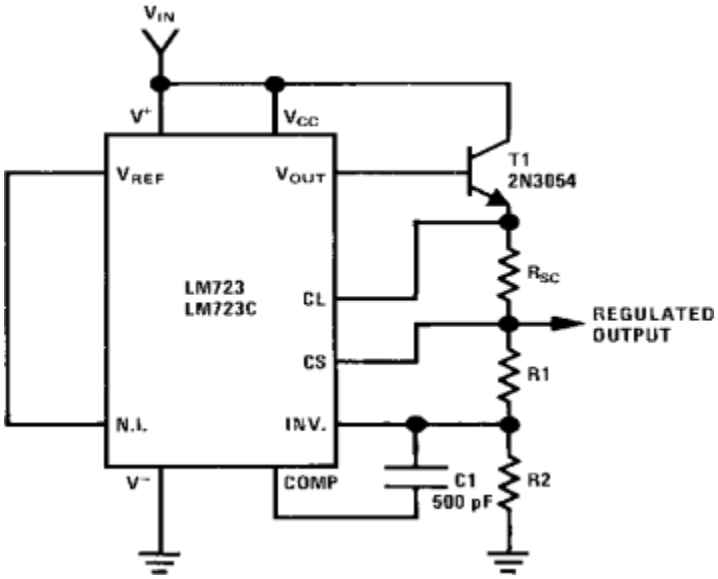

Fig: Typical circuit connection diagram

An external transistor Q is added in the circuit for high voltage low current regulator to improve its current sourcing capacity.

For this circuit the output voltage varies between 7 & 37V.

Transistor Q increase the current sourcing capacity thus IL(MAX) ia greater than 150mA.

The output voltage Vo is given by ,

$$V0=(R2/R1+R2)Vref$$

The value of Rsc is given by $Rsc = \frac{0.6}{ILimit}$