SERIES REGULATOR USING ZENER DIODE AS CONTROL ELEMENT

BY:

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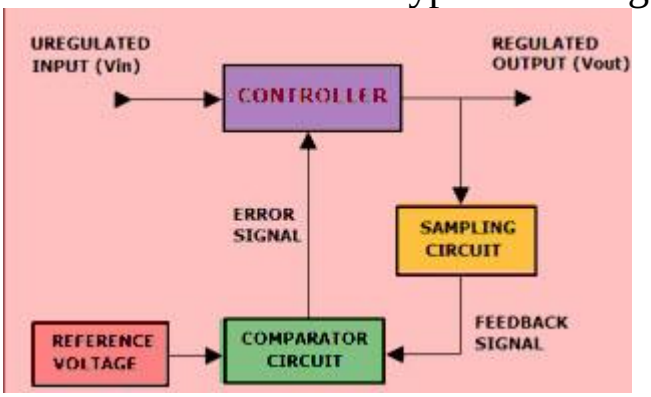
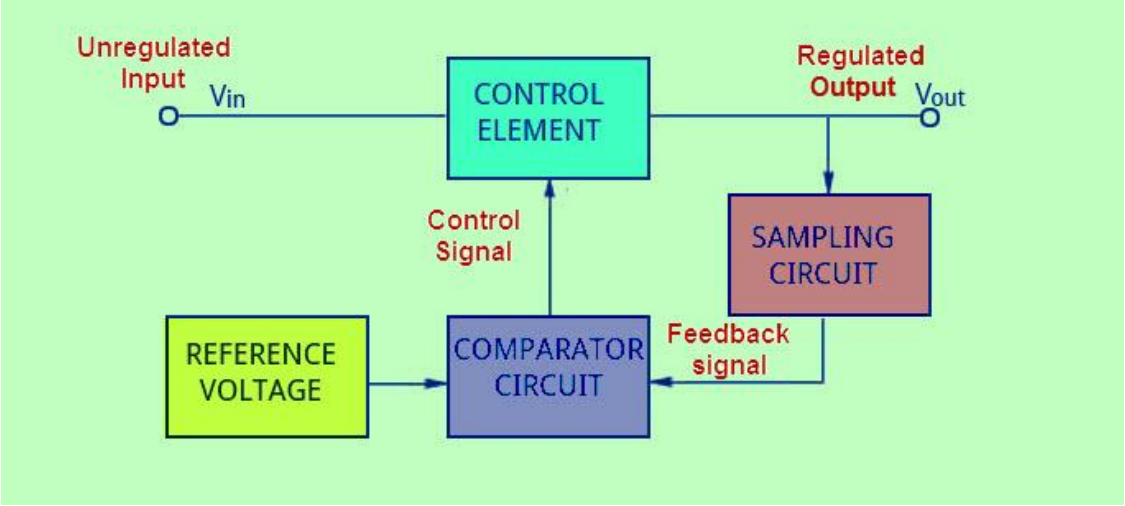
THEORY:

A voltage regulator is used to regulate voltage level. When a steady, reliable voltage is needed, then voltage regulator is the preferred device. It generates a fixed output voltage that remains constant for any changes in an input voltage or load conditions. It acts as a buffer for protecting components from damages. A voltage regulator is a device with a simple feed- forward design and it uses negative feedback control loops. There are mainly two types of voltage regulators: Linear voltage regulators and switching voltage regulators; these are used in wider applications. Linear voltage regulator is the easiest type of voltage regulators. It is available in two types, which are compact and used in low power, low voltage systems. Let us discuss about different types of voltage regulators.



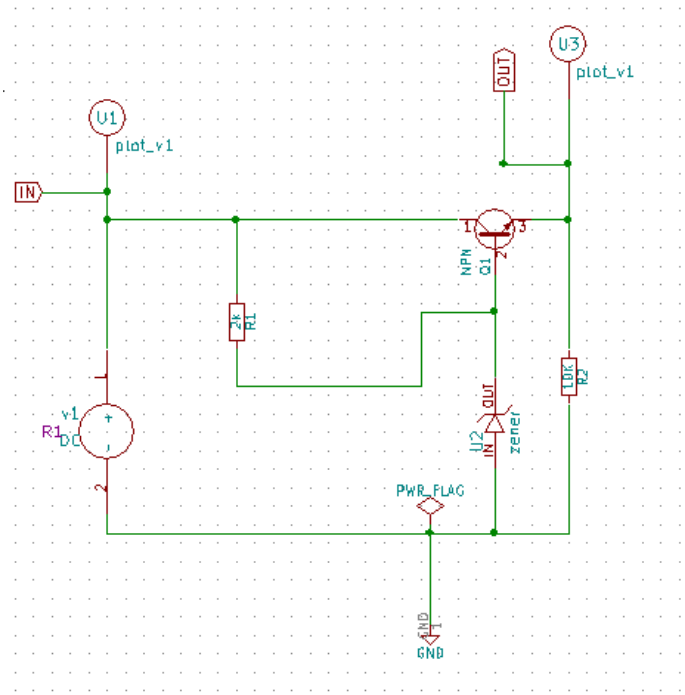
Series Voltage Regulator

A series voltage regulator uses a variable element placed in series with the load. By changing the resistance of that series element, the voltage dropped across it can be changed. And, the voltage across the load remains constant.



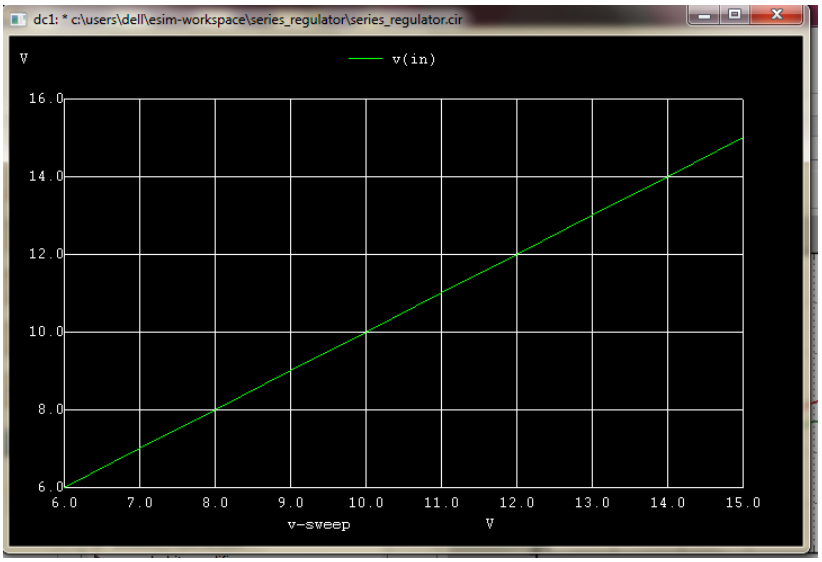
The amount of current drawn is effectively used by the load; this is the main advantage of the series voltage regulator. Even when the load does not require any current, the series regulator does not draw full current. Therefore, a series regulator is considerably more efficient than shunt voltage regulator.

DESIGN SCHEMATIC:

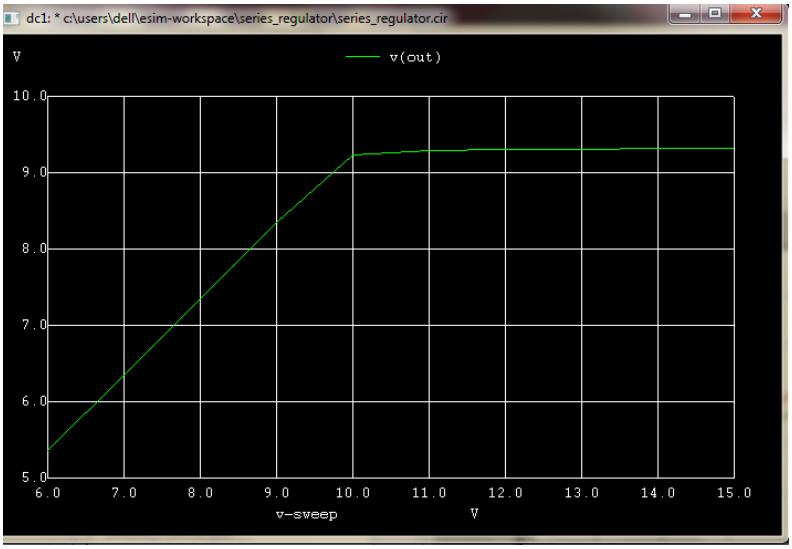


NGSPICE PLOTS:

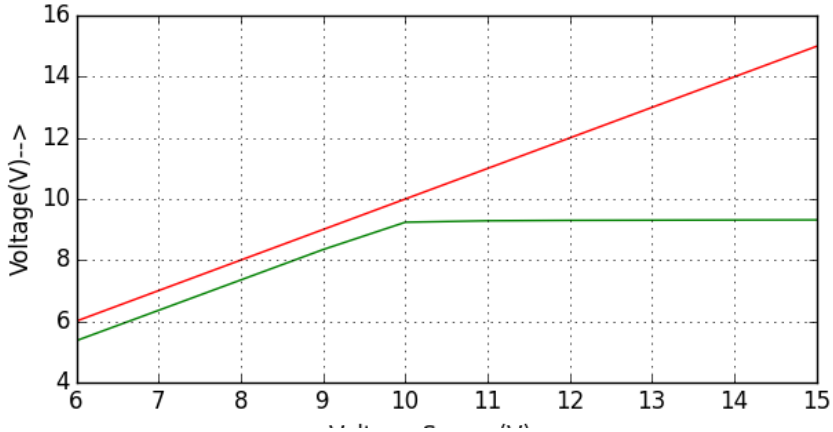
INPUT:



OUTPUT:



PYTHON PLOTS:



REFERENCE: http://www.radio-electronics.com/info/power-management/linear-power-supply-psu/series-voltage-regulator-theory-circuit.php