Structure of Linear Power Supplies

Even after commercial AC is rectified and smoothed, the DC that is produced is not stable (see page 7). A stabilization circuit converts this to DC with little variation in voltage. Let’s first examine a linear type stabilization circuit, which was once the most common type of stabilization circuit.

Linear power supplies require large and heavy power supply transformers.

Structure of Switching Power Supplies

Non-stabilized DC power that has been rectified is converted to high-frequency pulses by a switching element (a transistor or MOSFET) using high-speed switching and sent to a transformer. The output voltage is detected and compared and feedback data provided to control the pulse widths to produce stable DC. Switching power supplies are compact, lighter, and higher efficiency than linear power supplies, but the circuits are more complex and the high-speed switching generates noise, so noise countermeasures are essential.

Feedback control of the pulse width makes possible the generation of DC power with a uniform voltage.

Principles of Switching Regulators

The primary and secondary sides are electrically insulated and a signal is sent. The output voltage is detected and compared and feedback information provided. Transformers, choke coils, and capacitors can be miniaturized. Higher frequencies allow transformer cores to be made smaller. Ferrite and other materials with low high-frequency losses are used as the core materials.

Principles of Series Type Stabilization Circuits

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Linear power supplies place resistors in series to control the current, so they are also called series power supplies. They use resistance to reduce the voltage, so they are also called dropper and series dropper power supplies.

Key Point

Non-stabilized DC with voltage variations

Stabilized DC

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