

This self-oscillating flyback converter consists of:

- V2509 (converter-switch)
- R2509...R2517 (sense-resistors)
- V2502 (thyristor switch)
- R2544 (start-up resistor)
- T2501 (windings)
- 3 separate secondary circuits for -30V, -5V, and +5V

The main regulating component is operational amplifier N2501. This op-amp compares the produced secondary +5V voltage with a reference voltage, produced by zener diode N2502. If the secondary +5V increases, the fault signal generated by the N2501 will produce a current that causes an extra voltage drop over R2508. Because of this, thyristor V2502 will fire earlier. The switching frequency of the flyback converter increases and the secondary +5 V voltage decreases.

When the ScopeMeter is switched on (RSSLSTN is "active low"), V2544 (see circuit diagram A2c, figure 10.6) connects the inverting input of N2501 to ground. When the ScopeMeter starts up, capacitor C2509 causes the reference voltage and therefore the output voltage, to rise slowly, limiting the inrush ("starting") current drawn from the batteries or line voltage.

Undervoltage detection and protection circuit

When the flyback converter is oscillating, capacitor C2532 is charged every period via R2543 and V2516. During normal operation C2532 is discharged by V2517, which is driven via R2541, V2511, R2529, and V2509. If, for example, the secondary +5V voltage becomes too low, C2532 is not discharged by V2517. This will activate the RESPOWHT signal, and the power will be switched off completely, preventing further damage of circuits. (The +5V voltage can become too low because the input voltage -Vbat/s is too low, or the power output to the ScopeMeter circuitry is too high.)

R2542, C2531, and diode V2508 will reset C2532 during the start up of the power supply (the voltage across C2532 will become zero). This is necessary because V2517 cannot be driven via V2541, just after the ScopeMeter is switched on.

Reference source

The reference source provides a stable positive (+Vref) and negative reference voltage (-Vref) used in other parts of the ScopeMeter. It also uses the voltage across zener diode N2502 as an input voltage.

NOTE: The flyback converter, used in the battery charger section (section 3.4.8) has a fixed oscillating frequency of 100 kHz. The amount of energy supplied is regulated by varying the duty cycle. The flyback converter used in this power supply, however, is self-oscillating and operates on a variable oscillating frequency and a fixed duty cycle. For alkaline batteries, for example, the oscillating frequency is about 62 kHz.