12V or Adjustable, High-Efficiency, Low IQ, Step-Up DC-DC Controller

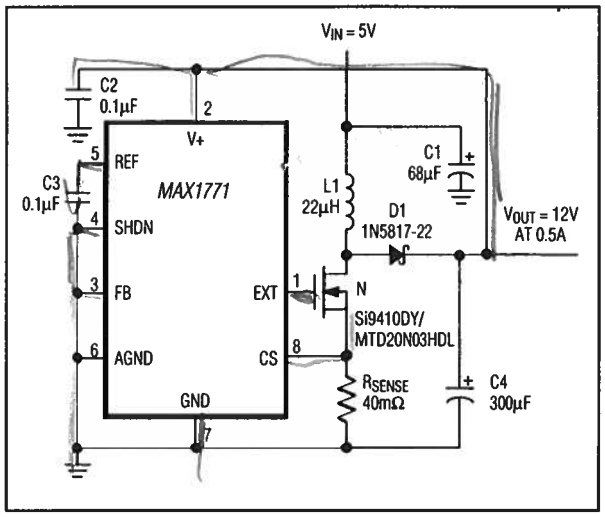


Figure 2a. 12V Preset Output, Bootstrapped

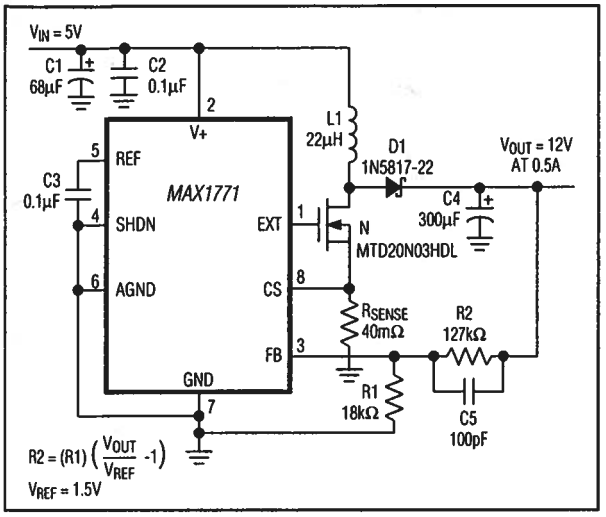


Figure 2b. 12V Output, Non-Bootstrapped

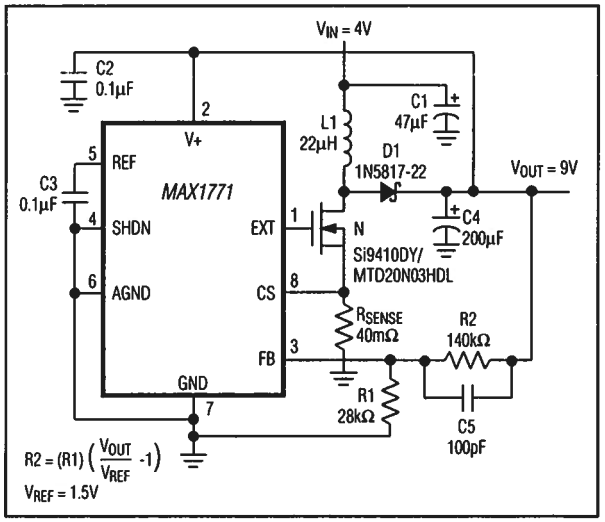


Figure 2c. 9V Output, Bootstrapped

increases at low input voltages. However, the supply current is also reduced because V+ is at a lower voltage, and because less energy is consumed while charging and discharging the external MOSFET's gate capacitance. The minimum input voltage is 3V when using external feedback resistors. With supply voltages below 5V, bootstrapped mode is recommended.

Note: When using the MAX1771 in non-bootstrapped mode, there is no preset output operation because V+ is also the output voltage sense point for fixed-output operation. External resistors must be used to set the output voltage. Use 1% external feedback resistors when operating in adjustable-output mode (Figures 2b, 2c) to achieve an overall output voltage accuracy of ±5%. To achieve highest efficiency, operate in bootstrapped mode whenever possible.

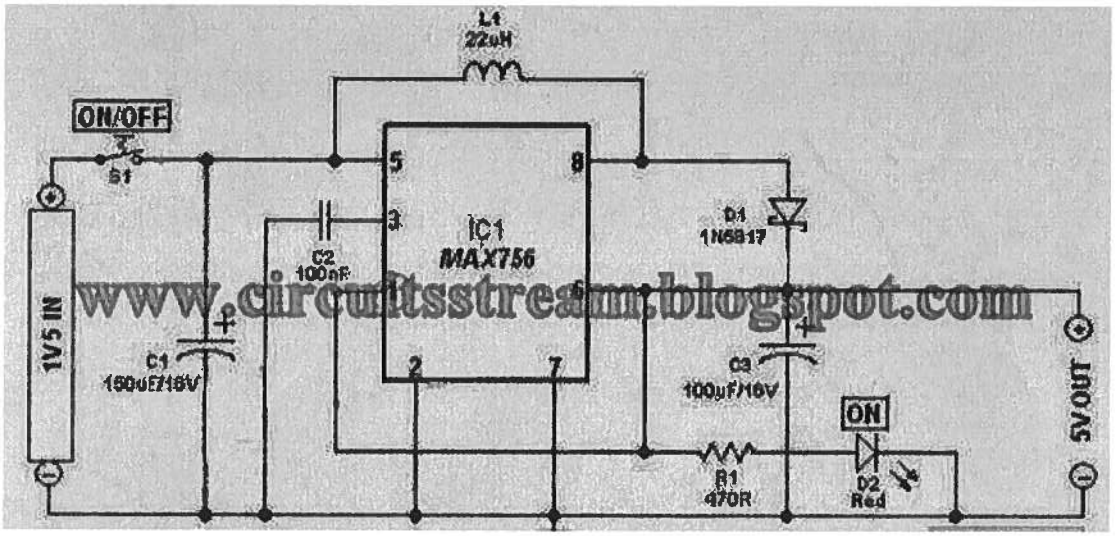
External Power-Transistor Control Circuitry

PFM Control Scheme

The MAX1771 uses a proprietary current-limited PFM control scheme to provide high efficiency over a wide range of load currents. This control scheme combines the ultra-low supply current of PFM converters (or pulse skippers) with the high full-load efficiency of PWM converters.

Unlike traditional PFM converters, the MAX1771 uses a sense resistor to control the peak inductor current. The device also operates with high switching frequencies (up to 300kHz), allowing the use of miniature external components.

As with traditional PFM converters, the power transistor is not turned on until the voltage comparator senses the output is out of regulation. However, unlike traditional PFM converters, the MAX1771 switch uses the combination of a peak current limit and a pair of one-shots that set the maximum on-time (16µs) and minimum off-time (2.3µs); there is no oscillator. Once off, the minimum off-time one-shot holds the switch off for 2.3µs. After this minimum time, the switch either 1) stays off if the output is in regulation, or 2) turns on again if the output is out of regulation.



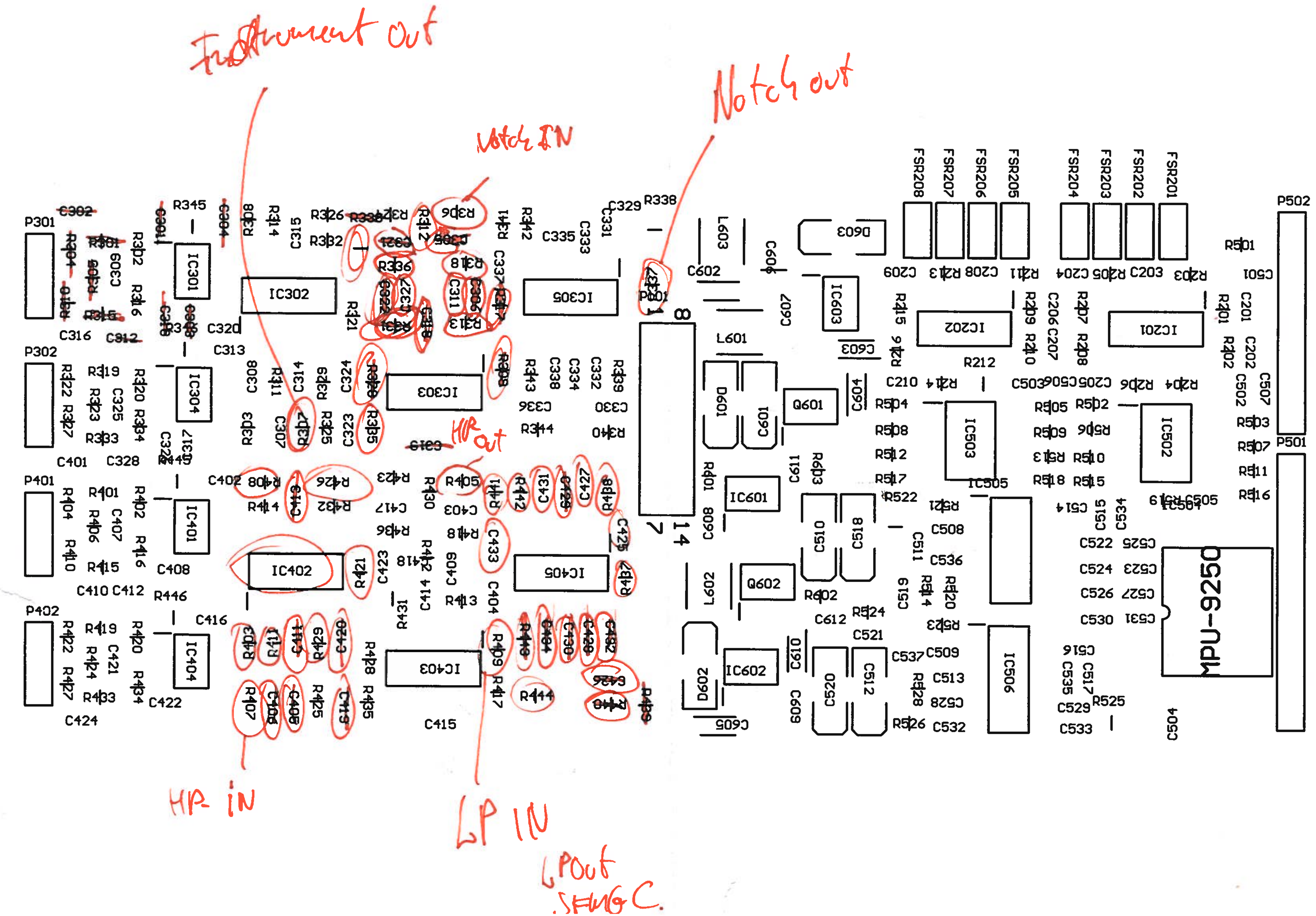
$R_1 = 150k\Omega$

$$\frac{R_2}{R_1} = \frac{V_{out}}{V_{Ref}} \quad R_2 = \frac{V_{out}}{V_{Ref}} \cdot R_1 =$$

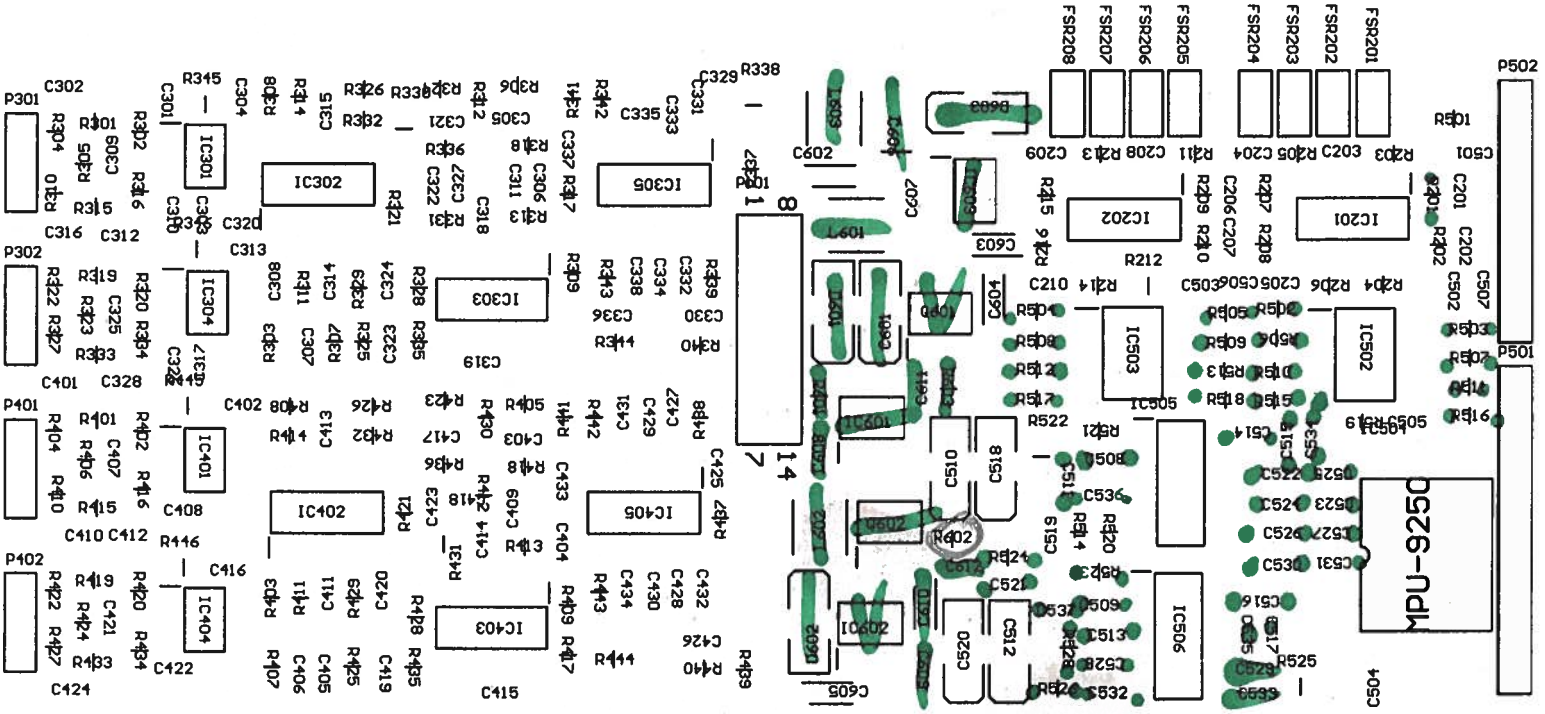
$$-12 = 10\mu A \Rightarrow R_2 = \frac{-12V}{10\mu A} =$$

$0,001,00\,\Omega$

CAMtasticDXP (TM):



CAMtasticDXP (TM):



$$U = R \cdot I$$

$$R = \frac{I}{U} = \frac{2}{12} = \frac{1}{6} \approx 0{,}2$$