Step-up Switching Regulator with Integrated Current Limit

007

1

014107 - 11

2

014107 - 12
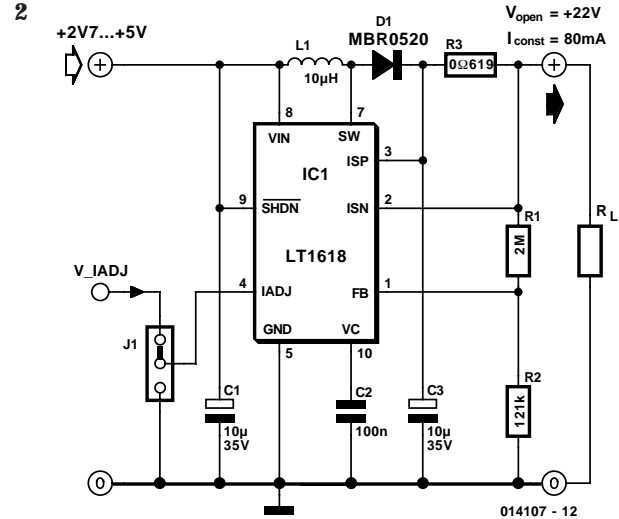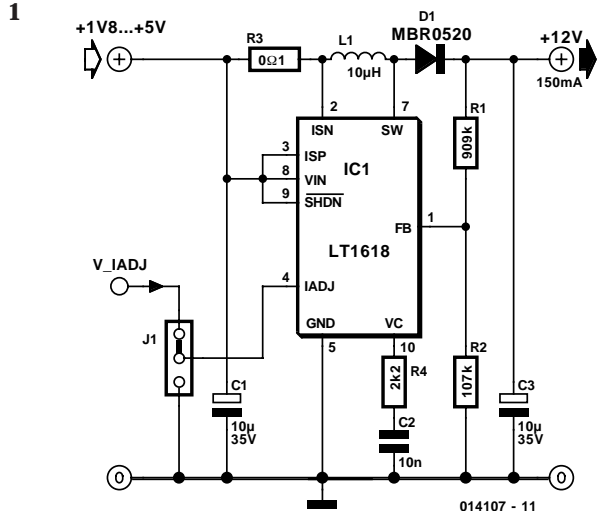
In the form of the LT1618, Linear Technology (www.linear-tech.com) has made available a step-up switching regula-

tor with a current limit mechanism. This makes it easy to protect an otherwise not short-circuit-proof switching reg-

ulator: the input voltage is always connected to the output via an inductor and a diode. We can limit the current at the input (**Figure 1**), which limits the current drawn by the entire circuit; alternatively, with the circuit of **Figure 2**, the output current can be limited. This enables the design of constant current sources at voltages higher than the input voltage. In the circuit shown the nominal output voltage of the step-up switching regulator will be around 22 V.

The output voltage can be calculated using the formula

$$V_{out} = 1.263 \text{ V } (1 + R1/R2)$$

The output current can be set via R3 as follows:

$$I_{max} = V_{sense} / R3$$
$$\text{where } V_{sense} = 50 \text{ mV}$$

The I_{ADJ} input can be set to a voltage between 0 V and + 1.58 V resulting in a linear reduction of the limit current.

The sense voltage of 50 mV across R3 for maximum current is reduced as follows:

$$V_{sense} = 0.04 \ (1.263 \text{ V} - 0.8 \ V_{IADJ})$$

Hence, for a fixed value of R3, the V_{IADJ} input allows the current limit to be adjusted.

Note that in the first circuit the sense resistor R3 is fitted between the input electrolytic capacitor and the inductor. If R3 is fitted before the capacitor, the inductor current cannot be properly controlled.

The LT1618 operates on input voltages between + 1.6 V and + 18 V. Its output voltage must lie between V_{in} and + 35 V. With a switching current of 1 A through pin SW to ground, an output current of around 100 mA can be expected. The switching frequency of the IC is about 1.4 MHz, and the device is available in a 10-pin compact MSOP package.

(014107-1)