

BPC SERIES POWER RESISTOR APPLICATIONS

BI Technologies offers the BPC Series of non-inductive, planar, thick film, power resistors for current limiting, power supply circuits and snubber circuits. Manufactured using 96% alumina substrates with ruthenium oxide resistors, the BPC Series power resistors are capable of withstanding a 20X overload for 8 ms and offer excellent performance and high reliability. BPC Series power resistors are available in 3, 5, 7.5 and 10 watt power ratings as shown below.

Model	BPC3	BPC5	BPC7	BPC10
Power Rating, Watts	3	5	7	10
Dimensions, mm				
Length	27.7	27.7	27.7	27.7
Width	10.2	12.7	19.1	25.4
Thickness	2.54	2.54	2.54	2.54
Range	200 mΩ to 200 KΩ			3 to 200 KΩ
Standard Tolerance	±10% (Standard), ±1%, ±2%, ±5% (Optional)			
Operating Temperature Range	-55°C to +125°C			
Operating Voltage, Maximum	300 Vac, 500 Vdc			
Temperature Coefficient of Resistance	±100 ppm/°C, Max. ±250 ppm/°C for values below 1Ω			

WHY USE BI TECHNOLOGIES BPC SERIES POWER RESISTORS

- Planar thick film cermet resistor offers very low inductance for high frequency operation
- 20X rated power surge capability
- Low operating temperature at board surface means high temperature solder is not required
- Large surface area to thickness ratio – maximizes power dissipation, minimizes hot spots
- Vertical mounting means power is dissipated above board level – enhancing board cooling due to natural convection flow
- Small footprint requires only 1/3 of the board area used by a typical wirewound resistor

INRUSH CURRENT SUPPRESSION

The BPC may be used to limit inrush current when a power supply is switched on. In Figure 1 is a typical PFC circuit in which two BPC 10 resistors in series function as inrush current suppression circuit which operates principally at switch-on

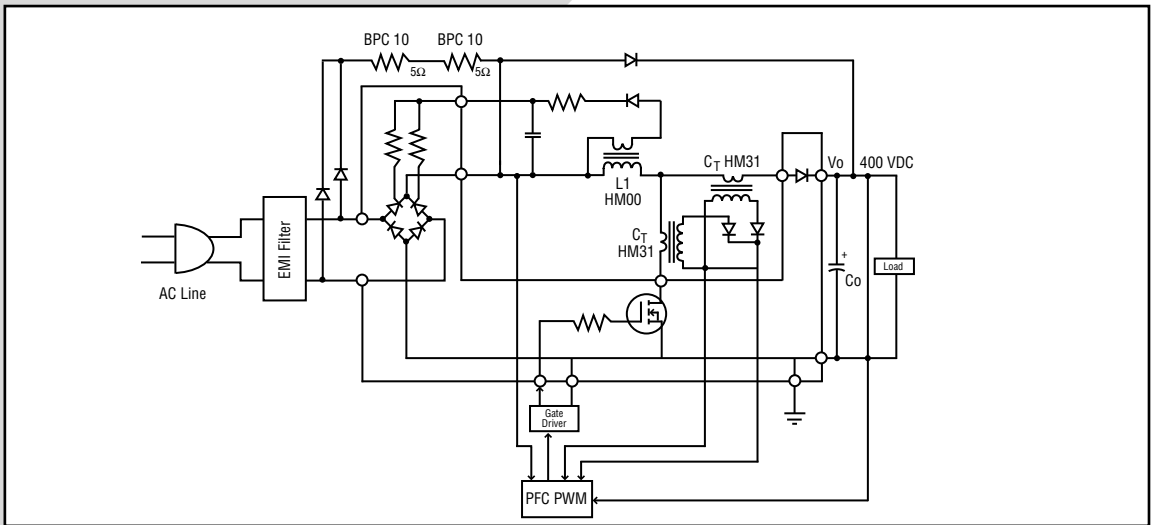


FIGURE 1. Typical PFC Circuit

SNUBBER CIRCUIT

The BPC may be used in series with a capacitor in a snubber circuit to filter spikes in the rising and falling edges of square waves. In Figure 2 a 500Ω BPC 3 is used.

STARTUP CIRCUIT

Figure 2 also includes a startup circuit that provides 18 volts to the PWM while the power supply is turning on. In this case, a 50KΩ BPC 5 is utilized.

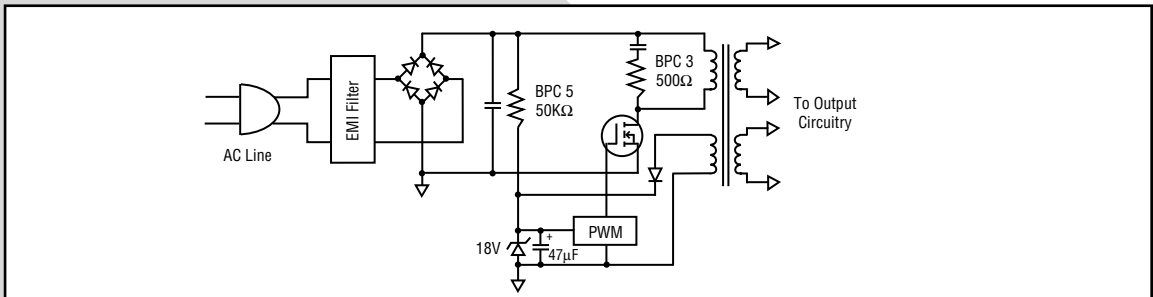


FIGURE 2. Typical startup and snubber circuits

INRUSH CURRENT LIMITING

This resistor limits the amount of current allowed to surge into the system at turn-on. Power resistors in this circuit must be able to withstand a 20 X nominal surge for 8 ms. This is typically a 15Ω, 7 to 10 watt, 10% resistor. A typical location of this resistor is shown in Figure 3. This resistor carries the main current load.

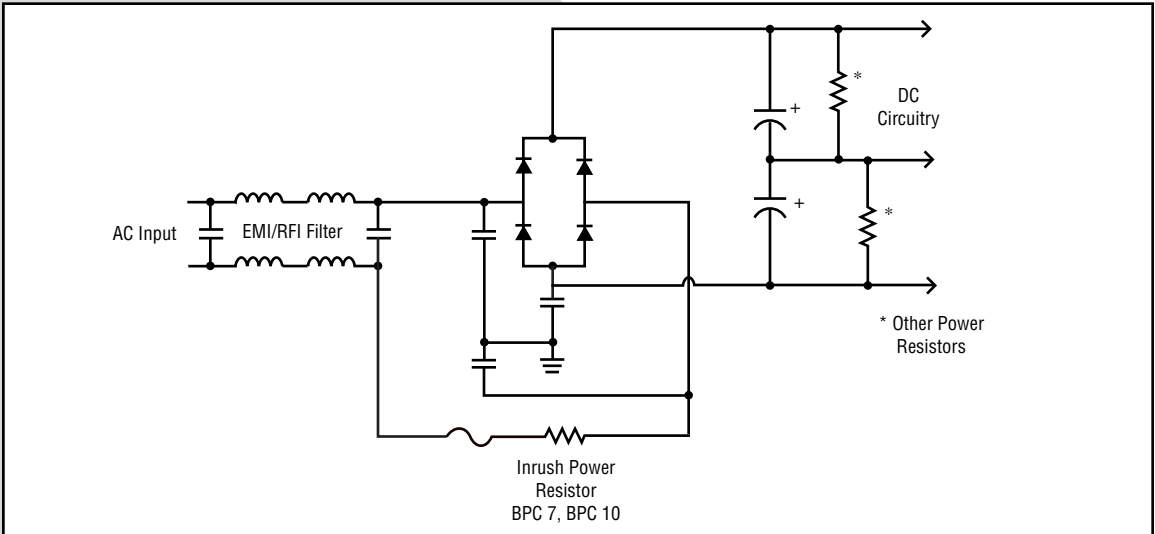


FIGURE 3. Circuit showing a BPC resistor in an inrush application

OTHER SNUBBER CIRCUITS

In these applications the power resistor bleeds the current of the magnetics to prevent inductive spikes. This resistor will experience voltage spikes at 2 X the switchmode switching frequency. This is typically a 500 Ω to 1K Ω, 3 watt to 5 watt, 2% to 5% resistor. Circuit configurations are found in Figure 4.

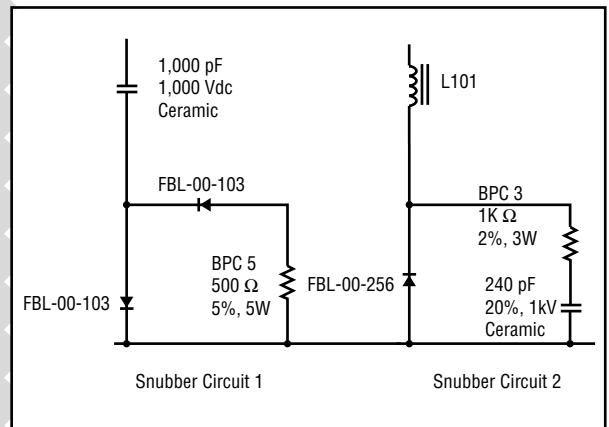


FIGURE 4. Snubber circuits found in power supplies.

BIASING (CURRENT CONDITIONING)

These resistors do not experience surges or spikes. This is a steady state application. In these applications the resistor values vary considerably from 200 Ω to 20K Ω, 3 watt to 5 watt, 2% to 5%. An example is shown in Figure 5.

PRELOADING 1

This resistor experiences a steady state condition. The typical resistor is 3 Ω to 1K Ω and needs 10% tolerance. The preloading is usually a function of the circuit. An example is shown in Figure 6.

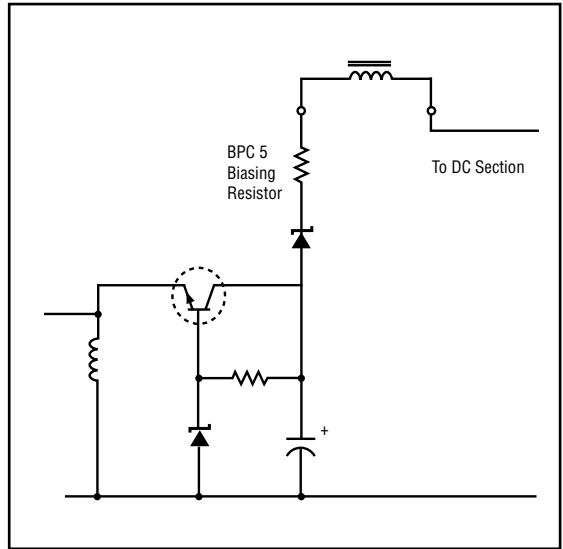


FIGURE 5. Circuit from a high current, power supply which uses a BPC resistor for biasing.

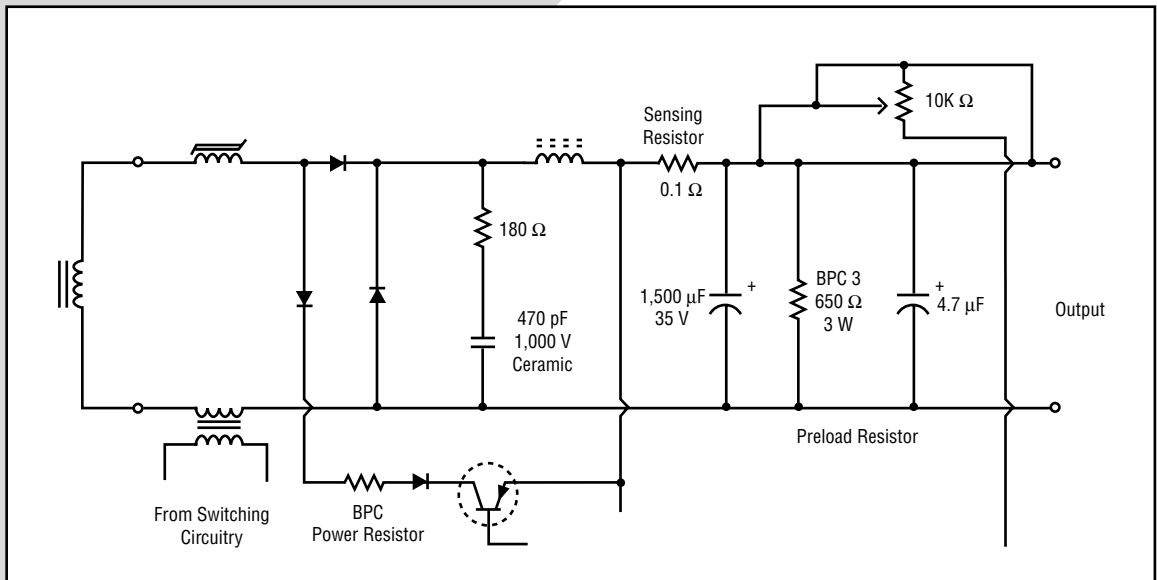


FIGURE 6. Part of proprietary power supply showing two power resistors.

CURRENT LIMITING

BPC resistors have uses as current limiters in high-voltage power supplies. An example of a high-voltage power supply, which is used to drive a laser, is shown in Figure 7 and the BPC resistor is highlighted.

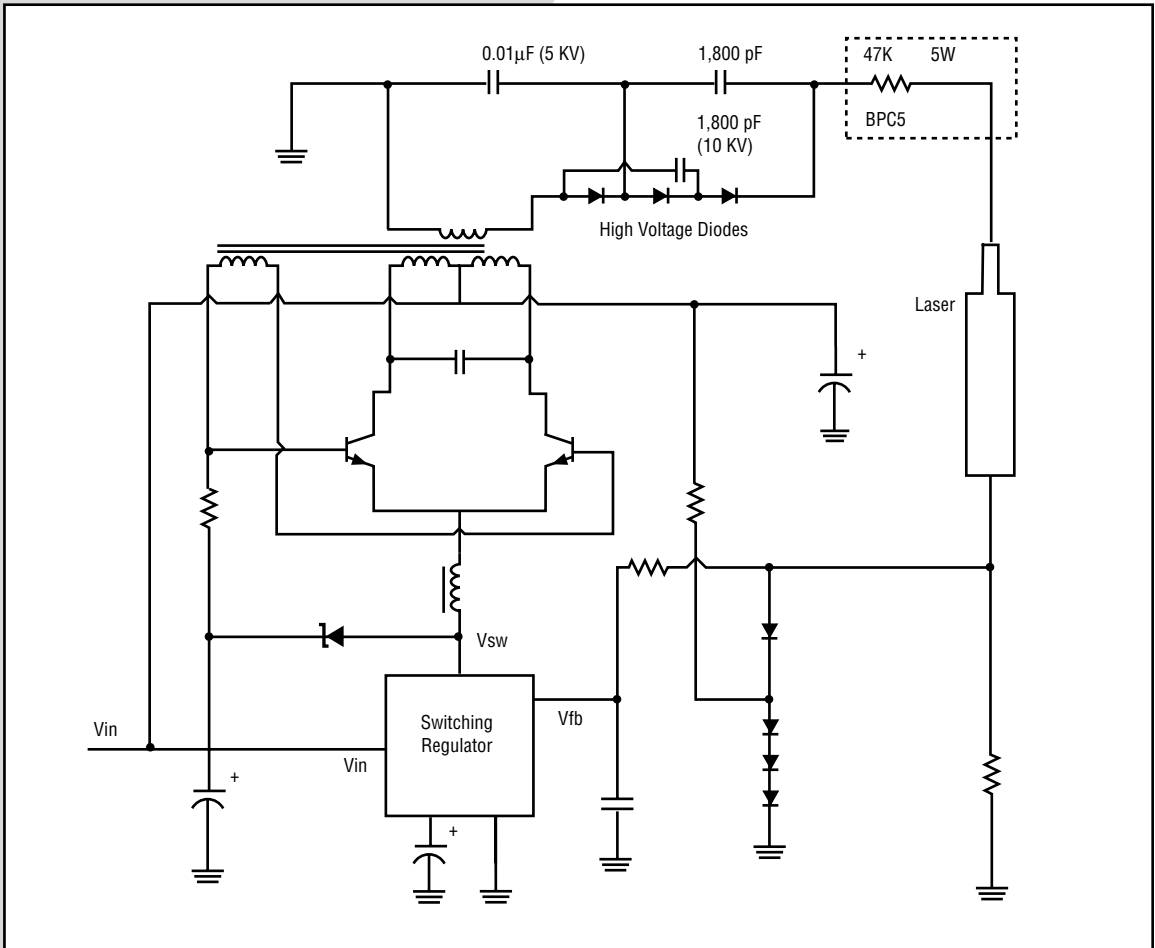


FIGURE 7. Laser power supply showing a BPC5 for circuit limiting.

PRELOADING 2

Another example of preloading is in a Battery Charger circuit as shown in Figure 8 where a resistor is used as a dummy load to prevent overcharging the battery.

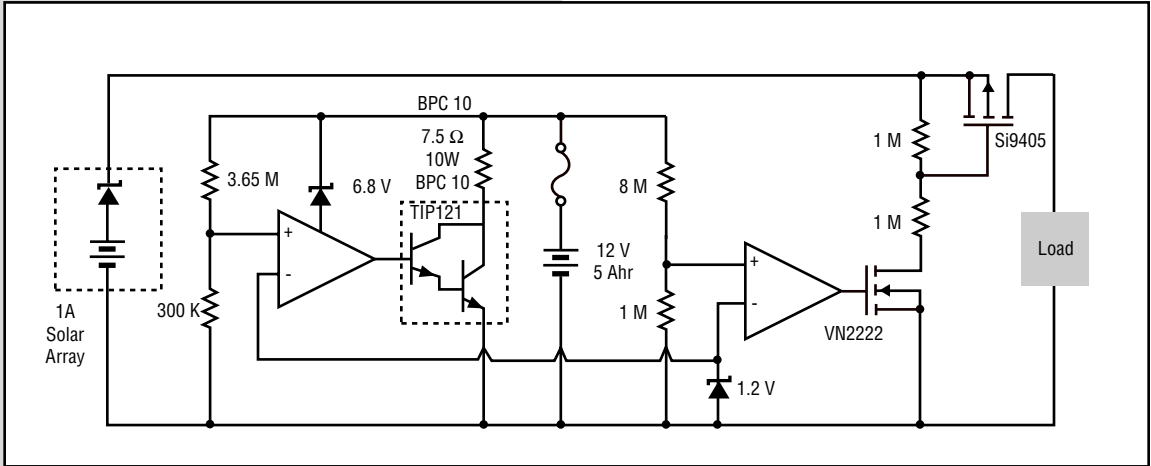
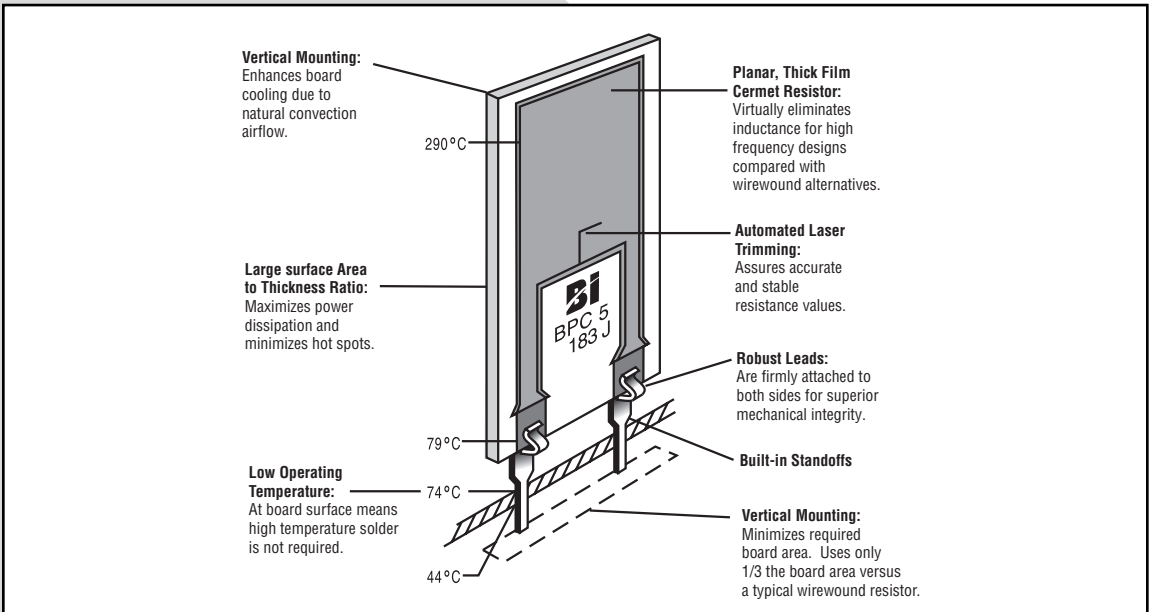
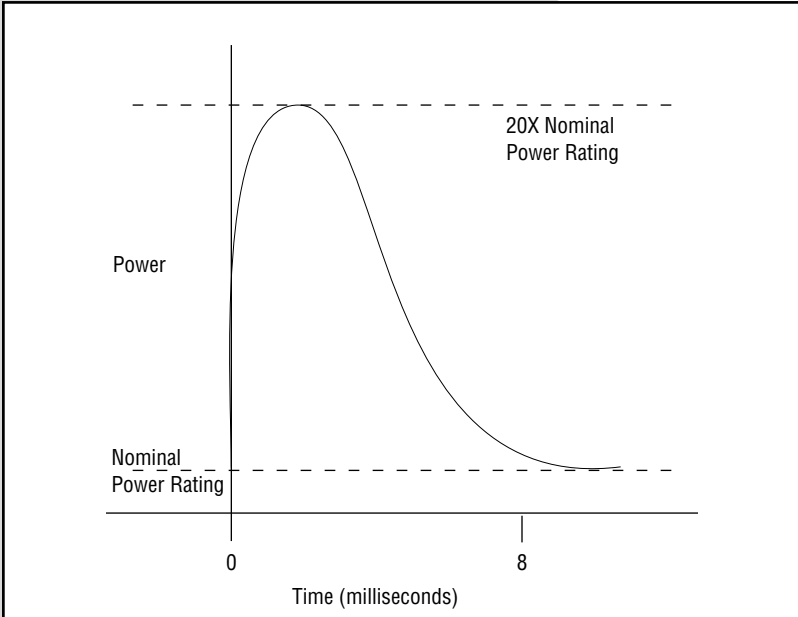


FIGURE 8. Shunt battery charger using a BPC10.



Model BPC5 (5 watt)

OVERLOAD CHARACTERISTICS - INRUSH APPLICATIONS



SIZE COMPARISON

