VI-RAM™ / MI-RAM™ Ripple Attenuator Module

Overview

The VI-RAM is an accessory product for VI-200, VI-J00 and Mega Modules, ComPAC DC-DC switchers, and FlatPAC AC-DC switching power supplies. It reduces line frequency related ripple and converter switching noise to less than 3 mV p-p (10 mV p-p on VI-J00 modules).

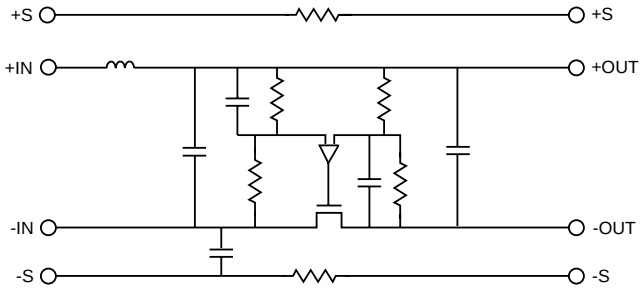
Features include:

- Reduced Differential Noise (<3 mV p-p at loads up to 20A)
  The input of the VI-RAM must be between 5 and 50Vdc.
- Active and Passive Filtering
- Attenuation of Low Frequency Input Power Source Harmonics and High Frequency Switching Components from DC-20 MHz
- Efficiencies of 95-99%
- Remote Sense, Trim, Overvoltage Protection and Overcurrent Protection Features Retained

Applications for the VI-RAM include medical diagnostic and automated test equipment, radio receivers, transmitters and communication products, and other products requiring the noise performance of a linear supply.

The patented VI-RAM module is a combination active/passive filter. A simplified block diagram is shown in Figure 1. The output of the switcher feeds directly into a high frequency passive filter which attenuates the switching noise. Low frequency, line related ripple attenuation is via a FET series regulator that maintains a constant average forward voltage drop of about 350 mV. The FET gate is modulated to maintain the AC component of the FET drain-source voltage equal to the ripple component of the incoming DC voltage, effectively cancelling it out.

Figure 1.



The power supply's sense leads feed through the VI-RAM for connection at the VI-RAM output, for local sense, or at the load, for remote sense (converter compensation is .5V maximum). The attenuation and insertion loss are constant up to 10A or 20A, depending on model. In overload (above 10A or 20A), the voltage drop will increase as the current increases. A single VI-RAM can be used on any output from 5Vdc to 50Vdc and will maintain the original output setpoint of the converter within 0.5% at the sense connection. Care should be taken not to connect In to Out terminals (i.e., through scope probe returns, grounds, etc.) as attenuation will be adversely affected.

The VI-RAM is intended to be used with the Vicor VI-200 and VI-J00, and the MI-RAM is intended to be used with the MI-200 and MI-J00 family of DC-DC converters.

Overview (cont)

Figure 2. VI-RAM with Optional Trimming Circuit and Optional Common Mode Choke for Conducted Noise (see Ch. 10 for more details)

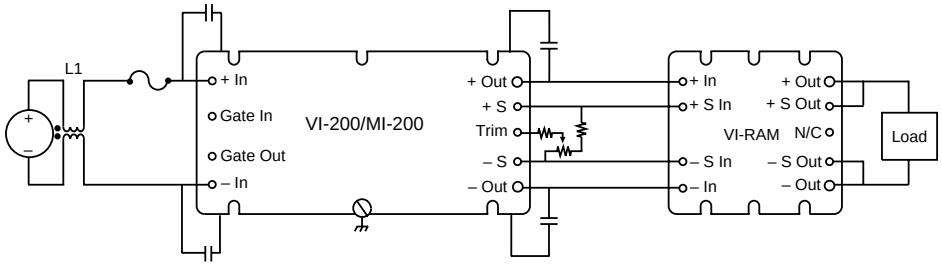


Figure 3. Attenuation vs. Frequency (Typical)