Basic Guidelines for Successful EMI Filtering

1. Keep current loops small. The ability of a conductor to couple energy by induction and radiation is reduced accordingly.
2. For conductor pairs, use wide (low Z) copper traces aligned above and below each other.
3. Locate filters at the source of interference; i.e., close to the power converter(s).
4. Filter component values should be chosen with consideration given to the desired frequency range of attenuation. For example, capacitors are self-resonant at a certain frequency, beyond which they look inductive. Keep bypass capacitor leads as short as possible.
5. Locate components on the PCB with consideration given to proximity of noise sources to potentially susceptible circuits. For example, the FIAM is an input line filter module that has been optimized for use with Maxi, Mini, and Micro DC-DC converters. When used in conjunction with the recommended external components and layout, it will significantly reduce the differential and common-mode noise returned to the power source. The FIAM meets the requirements of EN55022 "B", FCC "B", and Bellcore GR-001089-CORE, Issue 2 when used with any combination of Maxi, Mini, and Micro converters up to the FIAM's maximum rated current.

DC-DC converter inputs and outputs must be properly bypassed, to system chassis or earth. Bypass VIN and VOUT pins to each DC-DC module baseplate. Capacitor lead length must be as short as possible. (Figure 4.1)

EMI filtering can be application dependent. A packaged filter module may not always be the appropriate solution, and the general practice of bypassing V_{IN} and V_{OUT} may not produce optimal results. You may have to adjust the values depending on the severity of common-mode and differential-mode noise. (Figures 4.2 and 4.3)

Input transient suppression should be used in applications where source transients may be induced by load changes, blown fuses, etc. The level of transient suppression required will depend on the expected severity of the transients. A Zener diode, TRANSORB™, or MOV will provide transient suppression, act as a voltage clamp for DC input spikes, and provide reverse input voltage protection. The device voltage rating should be chosen above high-line voltage limits to avoid conducting during normal operation which would result in overheating.

Module shields that provide shielding around the belly (label side) of the Maxi, Mini, Micro are also available for applications that are highly noise sensitive. Module shield information is available on the Vicor website, see links provided, on the following page.

NOTE: *Acoustic Noise*: Audible noise may be emitted from the module under no load, light load or dynamic loading conditions. This is considered normal operation of the module.

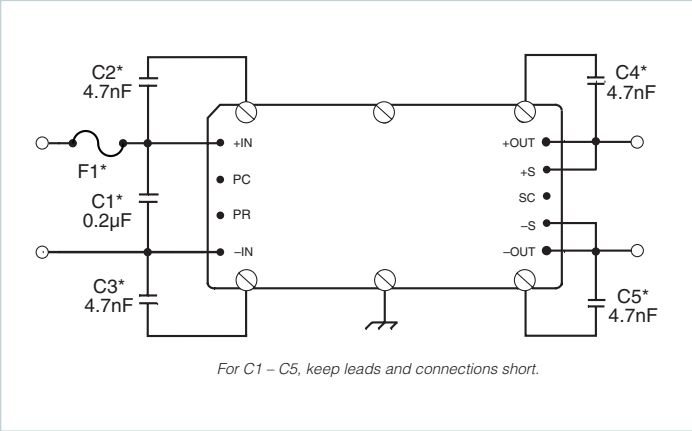

Figure 4.1 — *Recommended bypassing capacitors must be in close proximity, i.e., have short lead length to be effective*

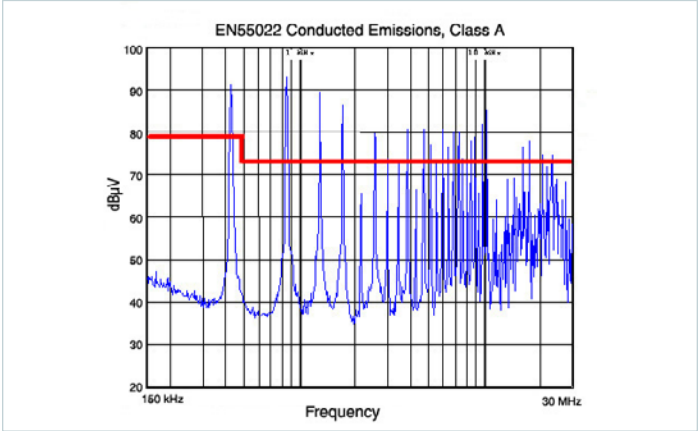

Figure 4.2 — *V48B28H250BN without bypass caps (330µF across input)*

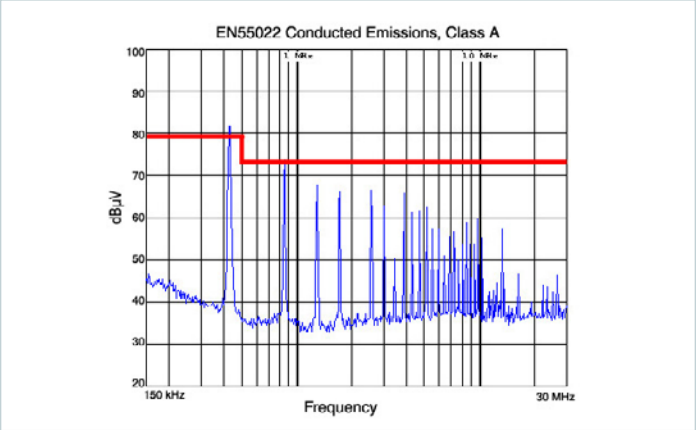

Figure 4.3 — *V48B28H250BN with recommended bypass caps (330µF across input)*

Module Shield Information
Module shield for Maxi with threaded or through-hole baseplate P/N 30142 http://asp.vicorpower.com/CADPDF/H7CEX3.PDF Module shield for Maxi with slotted baseplate P/N 30199 http://asp.vicorpower.com/CADPDF/HXE113.PDF Module shield for Mini with threaded or through-hole baseplate P/N 30180 http://asp.vicorpower.com/CADPDF/UT55TT.PDF Module shield for Mini with slotted baseplate P/N 30198 http://asp.vicorpower.com/CADPDF/HXE112.PDF Module shield for Micro with threaded or through-hole baseplate P/N 30143 http://asp.vicorpower.com/CADPDF/9YRD8X.PDF Module shield for Micro with slotted baseplate P/N 30141 http://asp.vicorpower.com/CADPDF/NG6SIS.PDF