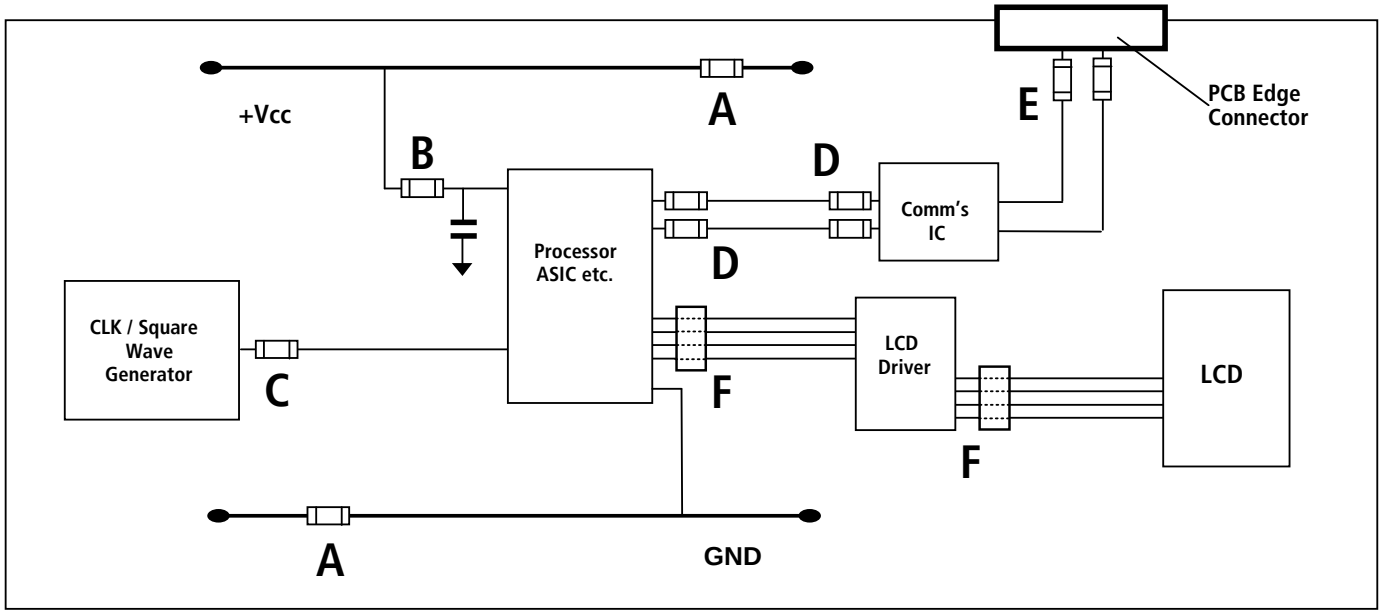
Suppression of Electro-Magnetic Interference on a P.C.B. using Ferrite Chip Bead Impeders

Surface mount ferrite chip beads provide compact, cost effective EMI filtering for densely packed PCB designs. The small footprint enables placement very close to troublesome high frequency devices.

The schematic below and subsequent text shows a simple electronic circuit. It details typical locations for ferrite chip beads, typical impedance and current values for those chip beads and why the designer would be likely to place the chip beads at those locations.



Ferrite Chip Impeder

Ferrite 4-Line Chip Array

A : Typically, High Current to Mid Current Chip Bead, Low to Medium Impedance. To attenuate DC-DC converter switching noise and coupled digital noise present on Vcc and GND lines.

B : Low Impedance (7 to 60 ohms), Low Current to Mid Current. To attenuate high frequency noise generated when Semiconductor device "wakes" and Icc switches from its low "sleep" current to a higher "on" current.

C : Low Current, Low to Medium Impedance. To attenuate high frequency harmonics of CLK frequency. For instance, if Clock is a 20MHz fundamental, the 5th Harmonic could be a 100MHz EMI signal.

D : Low Current, Low to High Impedance. To attenuate high frequency conducted noise on bi-directional data I/O lines.

E : Low to High Current, Medium to High Impedance. To attenuate wide band noise which is present on connecting cable and to prevent conducted noise from internal circuitry transmitting onto external cable.

F : Low Current, Low to High Impedance. To attenuate high frequency conducted noise on bi-directional or uni-directional data lines.

Key: Low Current = up to 800mA, Mid Current = up to 2,500mA, High Current = up to 10,000mA, Low Impedance = 7Ω to 120Ω, Medium Impedance = 120Ω to 400Ω, High Impedance > 400Ω