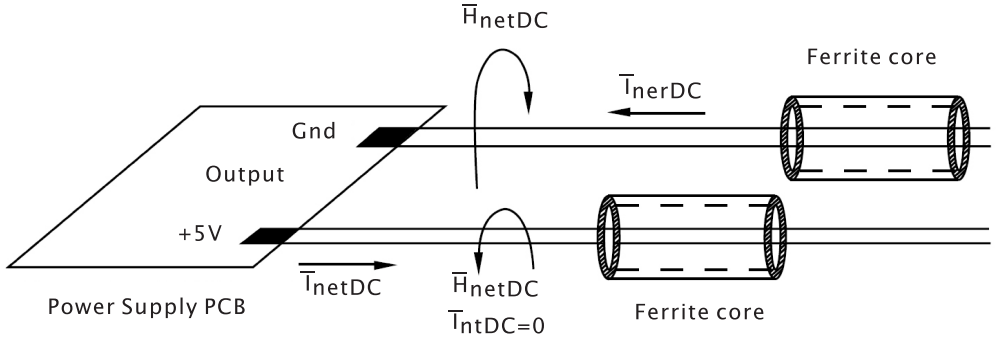

FIGURE 6 : Incorrect usage of cable ferrites to filter conductors carrying large DC components.

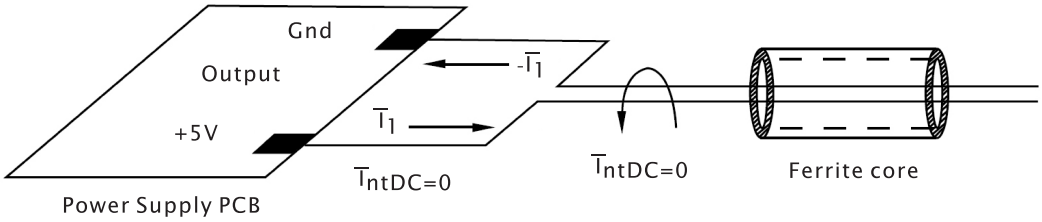

FIGURE 7 : Correct usage of cable ferrites on DC carrying conductors

■Ferrites for EMI Suppression on PCBs(應用於基板上作為抑制電磁波干擾的鐵氧磁體)

Attacking EMI Problems At The Source

Attacking EMI Problems At The Source(在電磁波源著手電磁波干擾問題)

A fundamental EMC design principle requires that EMI be attenuated at its source on the PC board.This strategy confines noise to the small regions of a given PC board and reduces the possibility that high frequency noise will couple to other circuits (often called receptor or victim circuits) that may radiate the noise more efficiently through interconnecting wires or openings in a product's shielding. Attacking EMI at the source generally provides the most cost effective design approach, since filtering is targeted only to a few specific noise generating circuits, rather than to every single possible noise receptor in the entire prodcut. Effective source filtering also helps limit overall EMC design costs by reducing the need for additional shielding that would otherwise be necessary to confine unfiltered high frequency noise components.
一個最基本的EMC設計原則是要能夠減低基板上電磁波源的電磁波干擾，這樣的策略使雜訊被局限在基板上的一小區域而且降低高頻雜訊與其他電路(通常被稱為感受電路或受害電路)耦合的機會，而將雜訊經由相接的導線或產品遮蔽的空隙有效地輻射出去，在電磁波源著手電磁波干擾通常是最有經濟效益的方法，因為此時濾波器只需針對幾處特定的雜訊產生電路而不是整個產品中的每一個可能的雜訊感受電路，有效的過濾電磁波源可藉由減少額外遮蔽的需求而降低整體EMC設計的成本，否則，對未過濾的高頻雜訊元件進行遮蔽將會是必要的。

Noise On the PC Board Power & Ground Distribution Network(在基板上的電源及接地分佈網路的雜訊)

PC board generated EMI originates from the periodic switching of digital circuits. A simple noise model of a digital integrated circuit (IC) is shown in Figure8. Each time the IC output switches state, it causes high frequency current to flow from the PC board power distribution bus (Vcc and "ground'). This action will introduce a small differential noise voltage drop, or "sag" across the board's power bus. Since this process will repeat with each transition of the IC's output, the noise that is induced on the PC board power and "ground' will oscillate at a frequency equal to the operating frequency of the IC. Additional IC's that reside on the PC board will "see" this noise voltage and couple it to other areas of the system. Power supply and data cables that are connected to the PC board power and ground bus will also transport and radiate the IC switching noise throughout and outside of the system.
基板上產生電磁波干擾源於週期性的切換數位電路，一個簡單的數位積體電路(IC)的雜訊模型列於圖例八，每次當IC的輸出在切換狀態，會從基板上電源分佈匯流排(Vcc及"接地線"線)產生高頻的電流，此行為會在板上的電流匯流排上產生一小差別的雜訊電壓降，或稱"衰弱"，因為此過程會隨IC輸出的每次傳輸而重複，所以在基板上的電源及"接地"上感應產生之雜訊會以與IC的操作頻率相同的頻率作振盪，在基板上額外的IC會"注意"到此雜訊電壓而與產生耦合並擴散至系統的其他區域，連接至基板上的電源及接地匯流排的電源供應及訊號線亦會傳導及輻射IC切換的雜訊至整個系統及至系統外。

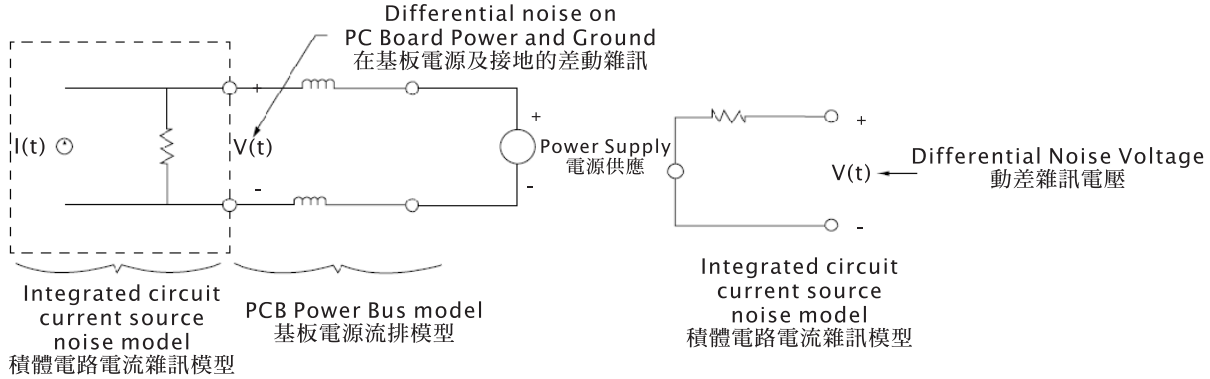

FIGURE 8: Noise voltage and current source models of an integrated circuit on a PC board