



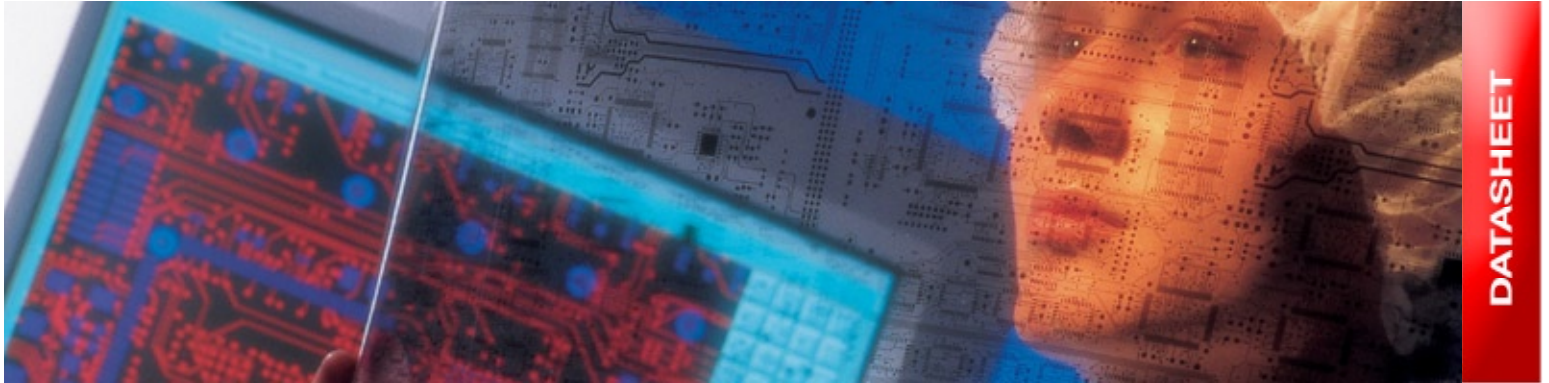
SANMINA - SCI®

PCB FABRICATION

Backdrilling and Blind/Buried Via Formation

Preserving signal integrity.

Backdrilling and Blind/Buried Via Formation techniques eliminate via stubs that degrade signal integrity.



Backplanes and other thick-format boards can endure significant Signal Integrity (SI) disturbances as a result of the unused portions of through-holes and vias that extend past their last connected layer. Known as “stubs,” these unused portions result in reflections, capacitance, inductance and impedance discontinuities – losses that become critical as propagation speeds increase.

A simple and effective method for managing these stubs is Backdrilling. Backdrilling is a Controlled Depth Drilling (CDD) technique that removes stubs with conventional numerically controlled (NC) drill equipment. It can be applied to any type of board where stubs cause SI degradation, with minimal design and layout considerations.

Decreasing via stub length by backdrilling significantly reduces a particularly problematic form of signal distortion called deterministic jitter. Because Bit Error Rate (BER) is strongly dependent on deterministic jitter, any reduction in deterministic jitter by backdrilling will significantly reduce the overall BER of the interconnect – often by many orders of magnitude. Other key advantages to backdrilling PTH vias include less signal attenuation due to improved impedance matching, increased channel bandwidth, reduced EMI/EMC radiation from the stub end, reduced excitation of resonance modes and reduced via-to-via crosstalk.

Key advantages include:

- Reduced deterministic jitter
- Lower bit error rate (BER)
- Less signal attenuation with improved impedance matching
- Minimal design and layout impact
- Increased channel bandwidth
- Increased data rates
- Reduced EMI/EMC radiation from the stub end
- Reduced excitation of resonance modes
- Reduced via-to-via crosstalk
- Lower costs than sequential laminations



A typical through-hole via

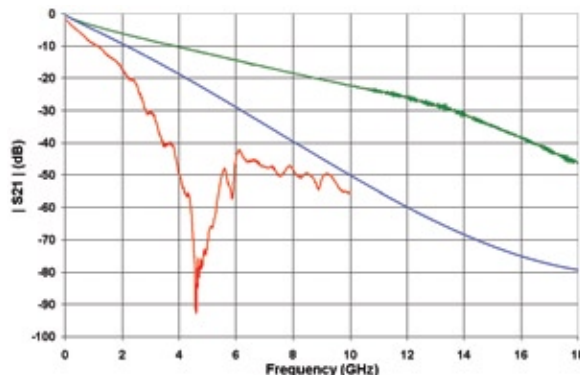
A backdrilled hole with a controlled depth

A second CDD technique for managing stubs is the formation of plated blind vias which prevent stubs from forming altogether. Blind Via Formation is possible at a much lower cost than multiple laminated build-up methods and achieves many of the same SI benefits.

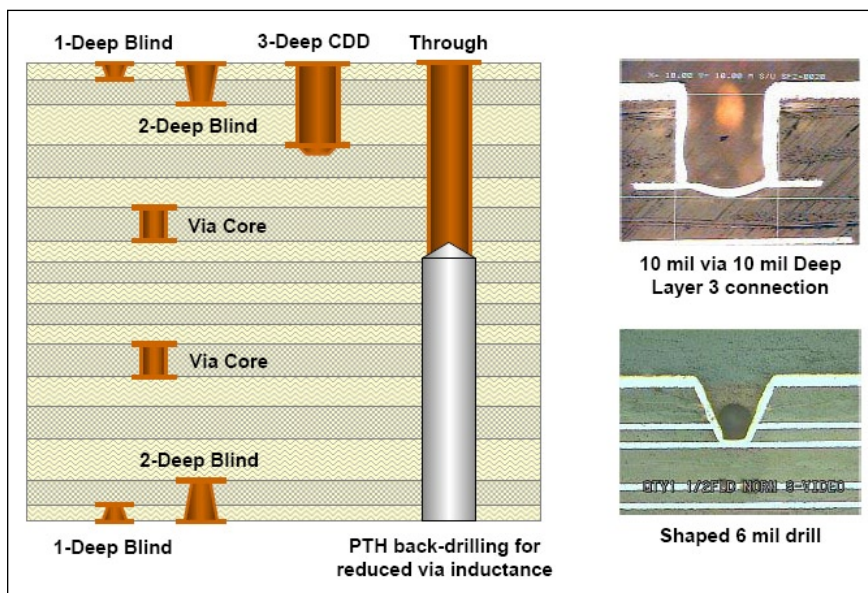
Blind Via Formation is limited by the throw of copper-plating baths to a maximum aspect ratio of 1:1. However, it can be used in conjunction with Backdrilling in thicker board types for more complete stub management, or even by itself in thinner board types where a 1:1 aspect ratio is sufficient to eliminate the desired degree and percentage of stubs. This method produces the same improvement in SI as Backdrilling where similar lengths of stub are eliminated.

As one of the world's largest manufacturers of high-technology PCBs, Sanmina-SCI® has significant experience in the design and production of boards using Backdrilling and/or CDD blind vias. We offer these capabilities throughout our fabrication

sites in the United States and worldwide, providing design for manufacturability (DFM) support for our customers in pre-design and layout phases to ensure a smooth integration of these technologies to the production process.



Improved frequency as a result of Backdrilling techniques



Controlled Depth Drilling

About Sanmina-SCI

Sanmina-SCI Corporation is a leading electronics contract manufacturer serving the fastest-growing segments of the global Electronics Manufacturing Services (EMS) market. Recognized as a technology leader, Sanmina-SCI provides end-to-end manufacturing solutions, delivering unsurpassed quality and support to OEMs primarily in the communications, defense and aerospace, industrial and semiconductor, medical, multimedia, enterprise computing and storage, automotive technology and renewable energy sectors. Sanmina-SCI has facilities strategically located in key regions throughout the world. More information regarding the company is available at <http://www.sanmina-sci.com>.



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