



SANMINA - SCI®

PCB FABRICATION

Embedded Passives – Buried Capacitance®

With the continuous trend to smaller feature sizes and faster signal speeds, embedded passives are becoming more cost-effective solutions for improved signal integrity. The Sanmina-SCI® Buried Capacitance® technology provides an effective approach for decoupling high-performance printed circuit board (PCB) components while reducing electromagnetic interference (EMI). Key performance enhancements in the Buried Capacitance laminate include thickness tolerance, improved dimensional consistency, and reduced levels of electrical breakdown during testing and use.

Buried Capacitance technology allows for a very thin dielectric layer that provides distributive decoupling capacitance and takes the place of conventional discrete capacitors. Unlike standard laminates, special copper foils and foil orientation are required to ensure uniform capacitance and electrical integrity.

Leading-edge Technology

To support an expanding market for Buried Capacitance products, Sanmina-SCI has globally licensed the ZBC-2000® and ZBC-1000™ technologies to more than 20 PCB fabricators and material manufacturers. The ZBC-2000 laminate is constructed using a single ply of either 106- or 6060-style prepreg, yielding a dielectric thickness after lamination of $.0020 \pm .0002$ inches when measured by cross sectioning. The ZBC-1000 technology results in a .0010-inch dielectric distributed capacitance material. FaradFlex™ and Interra™ Buried Capacitance products utilize a durable resin system for non-reinforced dielectrics for 1 mil thickness and below. Even more, higher capacitance value dielectrics have been developed using patented barium titanate technology.

As one of the world's largest manufacturers of high-technology PCBs, Sanmina-SCI has significant experience designing and manufacturing boards using Backdrilling and Blind-Via Formation technologies. We offer these technologies in each of our fabrication sites worldwide and provide design for manufacturability (DFM) support for our customers in pre-design and layout phases to ensure the smooth integration of these technologies to the production process.

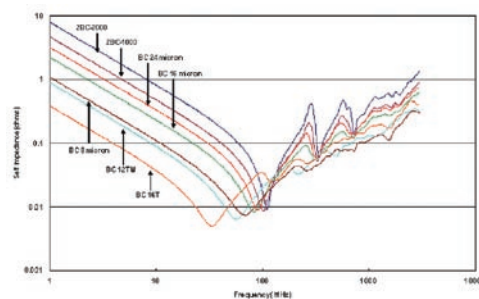
Improve signal integrity.

Sanmina-SCI's Buried Capacitance technology can increase the performance of printed circuit boards.



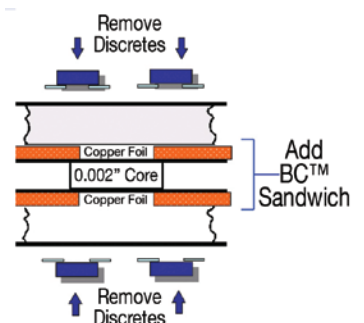
Product Highlights:

- Improved EMI
- Improved reliability
- Improved manufacturability due to glass reinforcement and specialty resins for film-based versions
- Improved power distribution
- Reduction of high-frequency discrete by pass capacitors material through common standard
- Reduction of undesired discrete capacitor resonance
- Lower-plane inductance at high frequencies
- Worldwide network of licensed laminators and fabricators
- Guaranteed quality and consistency of material through common standard



Buried Capacitance® – laminates impedances

Buried Capacitance® – cross section



Buried Capacitance Family of Materials

ZBC-2000 laminate:

- 2 mil (50 μm) dielectric thickness in different material types (4103-13, 4105-6, IS-410, P-96, 370 Turbo, Megtron)
- ZBC-2000 is the most commercially accepted material in the market
 - More than 12 years of experience in processing and long-term reliability history
 - Glass reinforced for improved rigidity
 - Bellcore/Telcordia recognized

ZBC-1000 laminate:

- 1 mil (25 μm) dielectric thickness
- FR-4 high-Tg commercially available in limited quantities
- Cost-effective development to meet customer requirements

FaradFlex (Oak-Mitsui Technologies):

- Film-based non-fiberglass reinforced dielectric
- Modified high-Tg FR-4 epoxy
- Three thicknesses available:
 - 0.96 mil (24 μm)
 - 0.47 mil (12 μm)
 - 0.031 mil (8 μm)
- High-Dk versions available:
 - 0.47 mil (12 μm), Dk of 10
 - 0.63 mil (16 μm), Dk of 30

Interra™ (DuPont Electronic Technologies):

- Film-based non-fiberglass reinforced dielectric
- Polyimide
- 1 mil (25 μm) thickness available

Property	Condition	Unit	FaradFlex™								Interra™
			ZBC-2000	ZBC-1000	BC-24	BC-16	BC-12	BC-8	BC-12TM	BC-16T	HK-04
Dielectric Thickness	Nominal	Mils (μm)	2.0 (50)	1.0 (25)	0.94 (24)	0.63 (16)	0.47 (12)	0.31 (8)	0.47 (12)	0.63 (16)	25
Dielectric Type	N/A	N/A	FR-4	FR-4	Modified FR-4	Modified FR-4	Modified FR-4	Modified FR-4	Modified FR-4	Modified FR-4	Polyimide
Tg	DSC/DMA	°C	170	170	200	200	200	200	200	200	195
Capacitance	DC-1 MHz	nf/in. ²	0.5	0.9	1.0	1.5	2.0	3.1	4.5	11.0	0.8
Capacitance	DC-1 MHz	pF/cm ²	78	140	155	233	310	481	698	1705	124
Plane self-Inductance	1 GHz	pH	49	38	35	29	23	18	23	29	Pending
Dk	1 MHz	N/A	4.2	4.2	4.6	4.6	4.6	4.4	10	30	3.5
Df	1 MHz	N/A	0.015	0.015	0.015	0.015	0.015	0.016	0.019	0.019	0.003
Peel Strength	As received	lb/in. ²	>6.0	>6.0	>8.0	>8.0	>8.0	8.0	6.0	6.0	9
Hi-Pot Test Pass	DC volts	Volts	500	500	500	500	500	500	500	100	500
Dielectric Breakdown	1kV/mil	Volts (DC)	>2.5	>2.5	5.3	7.3	5.0	5.0	6.2	2.8	6-7
UL Rating	N/A	N/A	94-V0	94-V0	94-V0	94-V0	94-V0	94-V0	In progress	In progress	94-V0

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 systems, medical instrumentation, multimedia, enterprise computing and storage, and automotive technology sectors. Sanmina-SCI has facilities strategically located in key regions throughout the world. More information regarding the company is available at www.sanmina-sci.com.



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