3M Electronic Performance Technologies

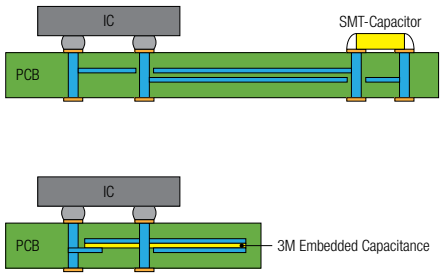
3M™ Embedded Capacitance Material

For over a century, 3M has leveraged its technology expertise and financial stability to help its customers innovate regardless of market conditions. Now, 3M brings forward another technology to help its customers differentiate their products – 3M Embedded Capacitance Material (3M ECM).

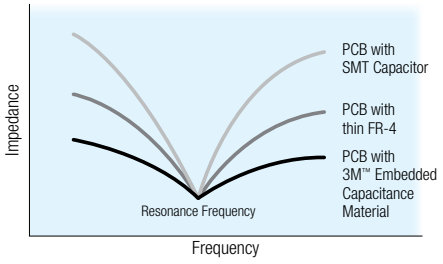
3M ECM is an embedded capacitance material that is designed to reduce impedance, power bus noise, EMI, and discrete capacitor count for OEMs with high speed digital and low pass filter designs who are seeking to differentiate their products through dramatically improved performance and reduced size. Unlike some of the competition, 3M does not require a license and provides global direct support from design through manufacturing to provide application optimization and high board yields, resulting in cost effective yet exceptional performance.

3M ECM is a UL recognized capacitor material with high capacitive density that can be embedded into printed circuit boards and chip packaging. 3M ECM consists of a very thin layer of ceramic-filled epoxy sandwiched between two layers of copper foil. 3M ECM has demonstrated success in applications in the telecom, computer, test and measurement, military/aerospace, medical and consumer electronics industries.

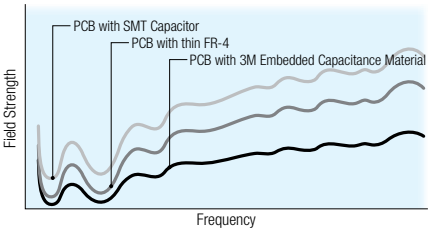
3M ECM Allows for Board Size Reduction



3M ECM Reduces Power Distribution Impedance



3M ECM Reduces EMI



Benefits

- Significantly improves performance via reduced impedance, power bus noise, and EMI
- Allows for removal of large numbers of discrete capacitors
- Increases usable board area, allowing for board size reduction
- Demonstrated to perform decoupling function better than discrete capacitors or competitive embedded capacitance materials in independent testing
- High value due to cost effective implementation, lack of 3M license requirement and strong performance
- 100% HiPOT testing
- RoHS compliant*
- No 3M license required
- Global direct support
- Extensive global fabricator network
- Fast delivery
- Demonstrated compatibility with standard PCB fabrication processes, including laser drilling
- Compatible with lead-free processing
- RA and ED copper
- Available in a variety of panel and copper sizes

3M™ Embedded Capacitance Material

Property	Test Method	11um	14um	19um
Dielectric Thickness	Cross-section	11 um (0.43 mils)	14 um (0.55mils)	19 um (0.75 mils)
Capacitance/Unit Area (1 kHz)	Supplier Method	8.1 nF/in2 (1.25 nF/cm2)	6.4 nF/in2 (1.0 nF/cm2)	6.0 nF/in2 (0.9 nF/cm2)
Capacitance Tolerance	Supplier Method	+/- 10%		
Dielectric Constant (1 kHz)	Supplier Method	16	16	20
Dissipation Factor (1 kHz)	Supplier Method	0.005	0.005	0.006
TCC	Supplier Method	Meets X7R requirements		
Dielectric Strength (Volts/Mil)	ASTM D149	3300		
HiPOT Insulation Resistance (Megaohm)	IPC-TM-650 2.5.7.2	100 min. at 100V DC (100% tested)		
Breakdown Voltage (Volts)	IPC-TM-650 2.5.7.2	>100		
UL Flammability Rating	UL 94	94 V-0		
UL Relative Thermal Index	UL 796	130°C		
UL Solderability Limits	UL 796	288°C/30 sec		
Glass Transition Temperature	Supplier Method (DSC)	120°C		
Moisture Absorption (wt %)	ASTM D570	0.11		
CTE (ppm/C)	Supplier Method	32 (x,y,z)		
Degradation Temperature	IPC-TM-650 2.3.40	360°C		
Peel Strength (pli)	IPC-TM-650 2.4.9 modified	3.8	3.8	6.0
Thermal Conductivity (W/m*K)	ASTM E1530	0.39		
Youngs Modulus (MPa)	Supplier Method (DMA)	1377		

All test data provided are typical values and not intended to be specification values.

*"RoHS compliant" means that the product or part does not contain any of the following substances in excess of the following maximum concentration values in any homogeneous material, unless the substance is in an application that is exempt under RoHS: (a) 0.1% (by weight) for lead, mercury, hexavalent chromium, polybrominated biphenyls or polybrominated diphenyl ethers; or (b) 0.01% (by weight) for cadmium. Unless otherwise stated by 3M in writing, this information represents 3M's knowledge and belief based on information provided by third party suppliers to 3M.

For more information, please visit our website to learn more: www.3Mcapacitance.com

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