FR-EZpure

Low temperature curing, thermosetting prepreg

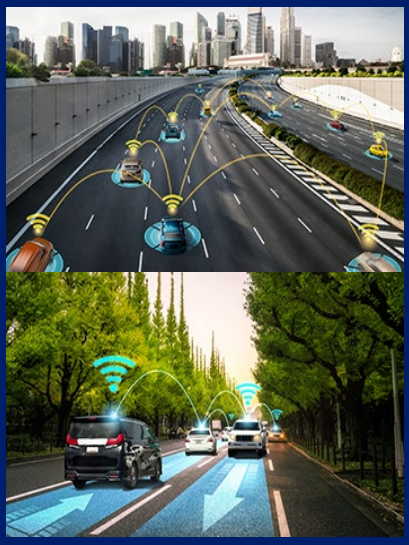
Your Dreams, Our Challenge

Benefits

- FR4 lamination temperatures
- Low DK enables reduced PWB thickness for the same impedance
- Thermosetting prepreg will not reflow
- Fiberglass-free prepreg
- Compatible with conventional lamination processes
- Can be combined with any core material
- Laser Ablatable

Applications

- High Speed Flex Cables
- Thin Multilayers
- ATE testing
- mmWave Antenna/Automotive
- Bonding of Subassemblies

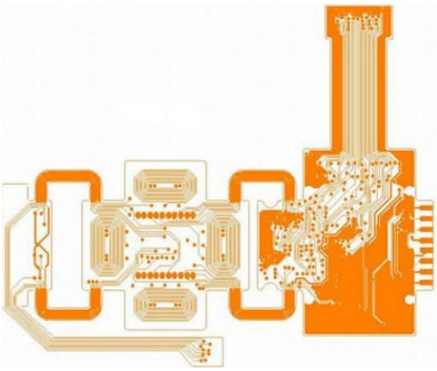


fastRise™EZpure is a low temperature curing adhesive for flexible and rigid PWBs. EZpure is a non-reinforced adhesive containing only a low loss thermosetting resin and ceramic additives. EZpure has been optimized to adhere to difficultto-bond-to substrates like PTFE, polyimide (DuPont™ Pyralux® AP/TK flexible circuit materials) and LCP.
The primary drawback of polyimides, LCPs and PTFE is the high temperatures normally associated with multilayer fabrication.

EZpure can be laminated at 200°C, thus preventing any unwanted dimensional movement of the copper clad laminate core. Because EZpure has no reinforcement and uses only submicron, or micron sized ceramic and polymeric resin, the optimal pressure for laminating can vary significantly. Important factors to consider are the thickness of EZpure that is being used and design features such as cutouts, cavities, copper retention and thickness, and the type of thieving used. Please consult with an applications engineer.

In testing EZpure bondply with LCP cores, PWBs have passed 260°C and 300°C solder reflow without defects. FR-EZpure has exhibited 5-7 lbs. of adhesion to LCP cores and that adhesion is stable after 260°C and 300°C thermal cycling.

EZpure's low loss enables the design of flexible high speed cables and rigid RF/digital multilayers without the uncertainties and costs associated with the high temperature lamination of PTFE or LCP materials. EZpure can be used to replace cable harnesses with denser flex circuits. The lack of a reinforcement makes EZpure a great candidate for laser vias. The low moisture absorption of 0.3% is very attractive vs. conventional polyimides.



EZpure can be sequentially laminated and has better bonding capabilities with copper than other RF prepregs. The low DK of EZpure is advantageous in flex applications to reduce thickness while maintaining the same impedance. The low modulus of EZ pure allows for more ductility in a thicker multilayer. The low dissipation values of EZpure is an option for any multilayer stackup where pure packages of other materials have fabrication challenges.

fastRise™ EZpure Laser Ablation

EZpure can be readily laser ablated as shown below as a matrix of 4, 5 and 6 mil holes (Figure 1). A copper plated microvia is shown in Figure 2. Figure 3 (800X) is a 4 mil dielectric layer of EZpure with a 150 μm via using an ESI 5335 UV laser.

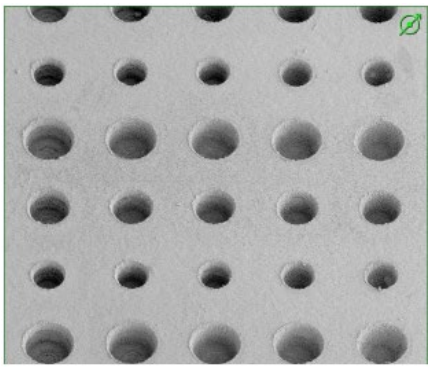


Figure 1

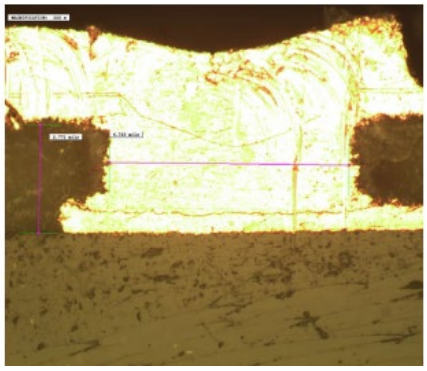


Figure 2

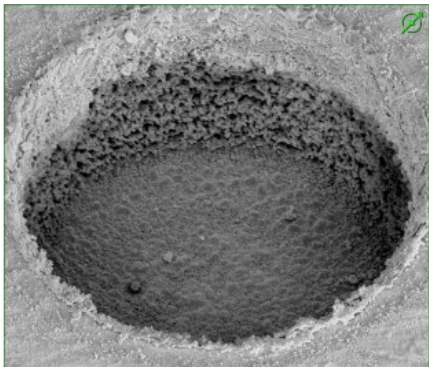
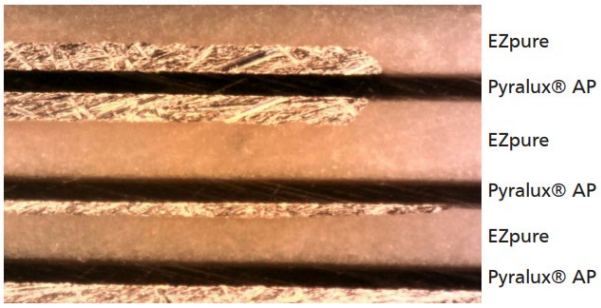
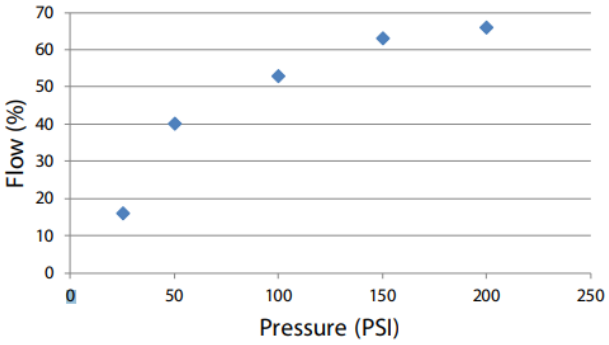


Figure 3

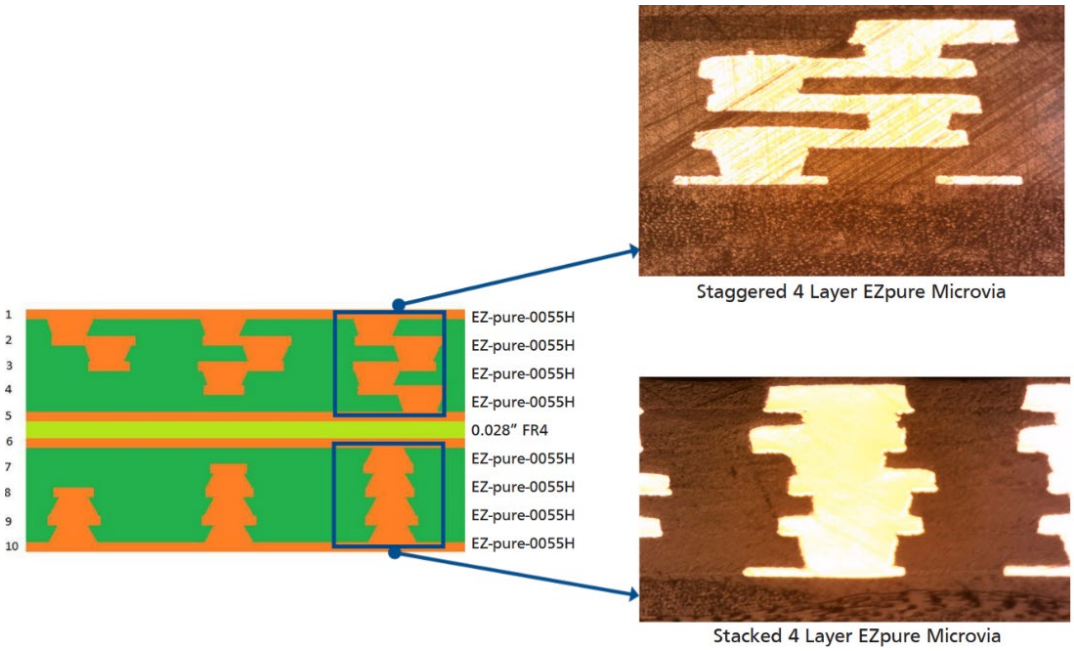




fastRise™ EZpure Flow Dependence on Pressure

fastRise™ EZpure HDI Buildup

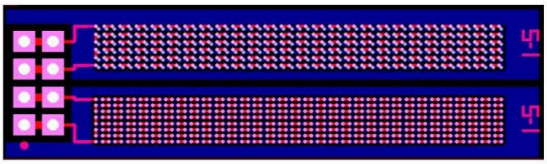
EZpure hybrid multilayers have been produced with a 28 mil FR4 core and varying layers of EZpure based microvia layers. 4 sequential laminations were performed to build both stacked and staggered microvias having 2, 3, and 4 layers of interconnect. The D coupons were analyzed by Conductor Analysis Technologies. The D coupons were subjected to 6X solder reflow before thermocycling from -55 to 178 ℃.



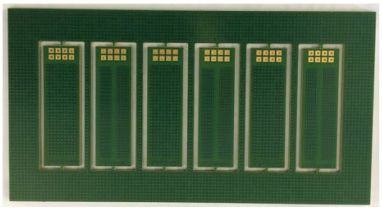
Staggered 4 Layer EZpure Microvia

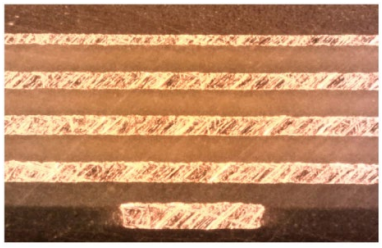
Stacked 4 Layer EZpure Microvia

EZpure microvias are 5mil in diameter with a dielectric spacing of 3-4 mils. Microvias were created with a UV/CO2 laser (UV/CO2/UV). PWB's were fabricated by TTM Technologies Forest Grove, Oregon.



Arrays of Daisy Chain Stacked and Staggered Vias, D Coupons





EZ-pure-0055H shows very consistent layer to layer dielectric spacing. Thermal cycling analysis by Conductor Analysis Technologies is available upon request. Please consult with your regional technical service manager.

Properties	Conditions	Typical Value	Unit	Test Method
Unpressed Thickness (Pressed)	1.5 (1.2), 2.0 (1.55), 3.0 (2.03)		mil	
Electrical Properties				
Dielectric Constant	@ 10 GHz	2.8		IPC-650 2.5.5.5.1
Dissipation Factor	@ 10 GHz	0.0032		IPC-650 2.5.5.5.1
Volume Resistivity		3.75×10^6	Mohms/cm	IPC-650-2.5.17E
Surface Resistivity		2.24×10^8	Mohms/cm	IPC-650-2.5.17E
Thermal Properties				
Thermal Conductivity		0.33	W/M*K	ASTM F 433/ASTM 1530-06
CTE (35 to 200 °C)	X, Y, Z	44	ppm/°C	IPC-650 2.4.41
T_d	2% wt. loss	375	°C	IPC-650 2.4.24.6 (TGA)
	5% wt. loss	386	°C	
T_g		168	°C	
Mechanical Properties				
Peel Strength		3.0	lbs/in	IPC-650 2.4.9E
	after solder float	3.0	lbs/in	
	after thermocycling	3.0	lbs/in	
Dimensional Stability	MD	-9.8	mils/in	IPC-650 2.2.4 (TS)
	CD	-10.3	mils/in	
Tensile Strength		800	psi	IPC-650 2.4.19
Chemical / Physical Properties				
Chemical Resistance		90	%	IPC-650-2.3.2G
Elongation at break		19.5	%	IPC-650 2.4.19
Fungus Growth		0 (no growth)		IPC-650-2.6.1

A rigid flex construction of EZpure/Pyralux® AP/FR4 has passed IST, HATS and Lead Free reflow:

fastRise™EZpure Thermal Reliability				
Test Standard	**Via Size**	**Preconditioning**	**Cycles**	**Pass/Fail**
IST	17.5 mil and 17.7 mil (50 mil and 100mil pitch)	6X at 260˚C	1000 Cycles Room Temp. to 160˚C	Passed (<10% Change in resistance)
HATS	7.9 mil, 9.8 mil, 14.5 mil and 17.7 mil	-	500 Cycles -55˚C to 125˚C 2 cycles per hour	Passed (<10% Change in resistance)
Solder Stress	-	6x at 288˚C	-	Passed
IPC-6013 Group A	-	-	-	Passed

* All test data provided are typical values and not intended to be specification values. For review of critical specification tolerances, please contact a company representative directly.
* Please contact AGC for availability of additional thicknesses, other sizes.

agc-ml.multimaterial@agc.com