*fast*Rise™ 77 Prepreg

Preliminary Data Sheet

*fast*Rise™ 77 is a thermally stable, high DK (7.7 at 10 GHz), low loss prepreg designed to enable the manufacture of high dielectric constant stripline structures at low temperatures. *fast*Rise™ 77 prepreg enables stripline manufacture at 420ºF/215ºC, well below the fabrication temperatures of Low Temperature Co-fired Ceramics (LTCC).

Organic high dielectric constant copper clad laminates such as RF-60A have previously had no available prepregs with compatible high dielectric constant. Therefore RF stripline designers have been forced to use either LTCC or the fusion bonding of PTFE-based organic substrates.

RF engineers design high dielectric constant stripline structures to: (1) densify/miniaturize circuits (2) eliminate cross talk between multiple channels (3) create more confined fields (4) create more symmetrical EM fields with better control over even/odd mode impedances (5) reduce radiation (6) allow for broadband multi-octave couplers and filters (7) design phase matching networks. Miniaturization is especially important for weight reduction in avionic applications.

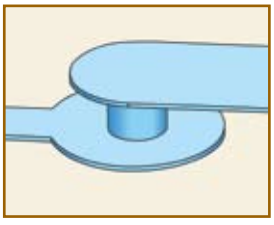
For organic structures, RF designers generally resort to fusion bonding to create symmetrical dielectrics above and below the signal layer. Fusion bonding is the melting of PTFE at very high temperatures. Fusion bonding is expensive, there are few capable fabricators and it is prone to unpredictable dimensional movement and poor layer to layer registration*. *fast*Rise™ 77 is a low cost solution that enables epoxy fabricators to build moisture resistant RF stripline structures.

When combined with Ticer or Ohmega resistor foil, *fast*Rise™ 77 leads to a lower likelihood of resistor cracking, a typical defect in fusion bonded structures.

Benefits & Applications:

- High 7.7 DK organic prepreg
- Low (215ºC/420ºF) lamination enables conventional PWB fabrication
- Lower cost/reduced weight alternative to LTCC
- Lower cost alternative to fusion bonding
- Enables miniaturization & densification of high DK RF stripline structures
- Compatible with Ticer/Ohmega resistor foils

- Military and Avionics (weight reduction)
- Radar Manifolds, Antennas, Fire Control
- Filters, Couplers, Power Amplifiers
- Phase Matching Networks



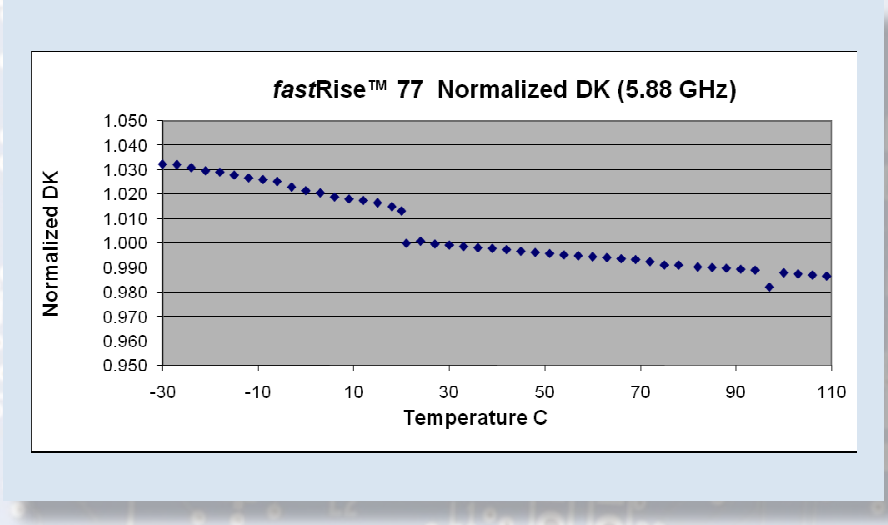
* For more information, please visit **www.taconic-add.com** and view **Technical Topic: Strategies for Designing Microwave Multilayer Printed Circuit Boards Using Stripline Structures.**

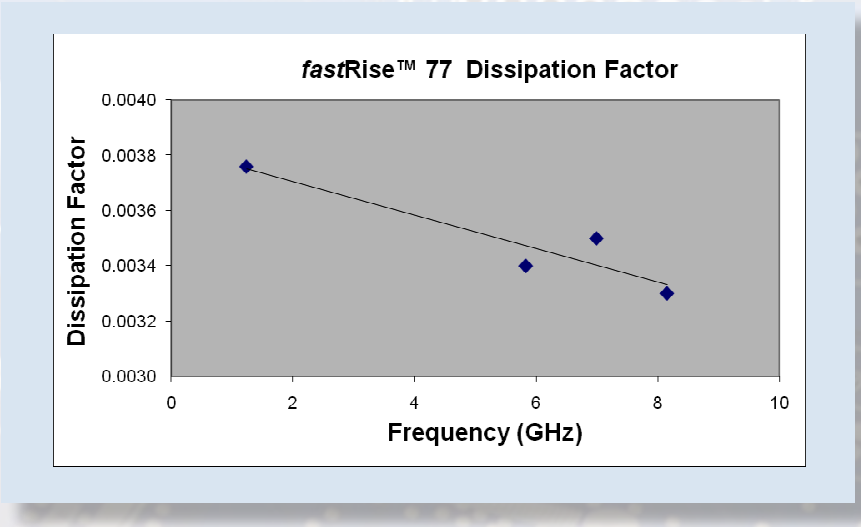
North & South America
Taconic - Headquarters
Petersburgh, NY 12138
Tel: 518-658-3202 / 1-800-833-1805
addinfo@4taconic.com

Europe/Middle East/Australia
Taconic International Ltd.
Republic of Ireland
Tel: +353-44-9395600
add@4taconic.com

Asia
Korea Taconic Company
Republic of Korea
Tel: +82-31-704-1858
sales@taconic.co.kr

China
Taconic Advanced Material (Suzhou) Co., Ltd.
Suzhou City, China
Tel: +86-512-8718-9678
tssales@taconic.co.kr

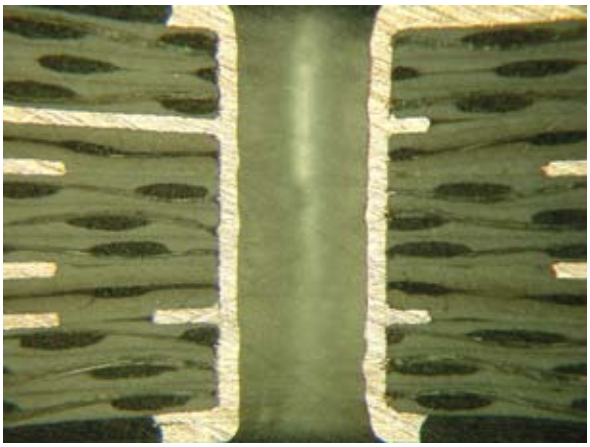

*fast*Rise™ 77 Normalized DK (5.88 GHz)
Normalized DK
1.050
1.040
1.030
1.020
1.010
1.000
0.990
0.980
0.970
0.960
0.950
-30
-10
10
30
50
70
90
110
Temperature C

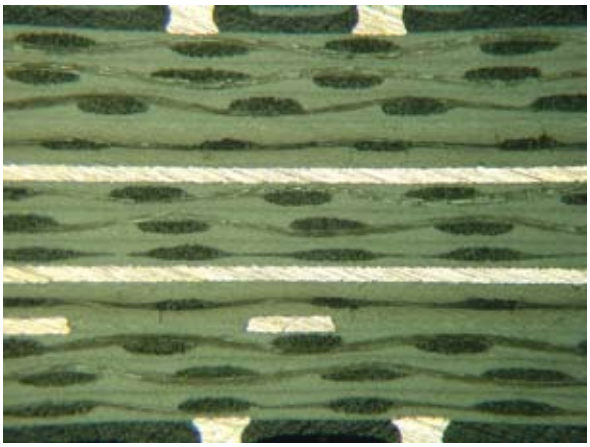

*fast*Rise™ 77 Dissipation Factor
Dissipation Factor
0.0040
0.0038
0.0036
0.0034
0.0032
0.0030
0
2
4
6
8
10
Frequency (GHz)

*fast*Rise™77 Typical Values					
Property	Test Method	Unit	Value	Unit	Value
Pressed Thickness Between Ground Planes		mils	5.5	mils	5.5
Dk @ 10 GHz	IPC 2.5.5.5.1 (modified)		7.7		7.7
Dk @ 500 MHz	Full Sheet Resonance		7.85		7.85
Df @ 10 GHz	IPC 2.5.5.5.1 (modified)		0.0034		0.0034
Moisture Absorption	IPC-650 2.6.2.1	%	0.1	%	0.1
Dielectric Breakdown	ASTM D 149/IPC-650 2.5.6	kV	40.0	kV	40.0
Volume Resistivity	IPC-650 2.5.17.1 (after temp./humidity)	Mohms/cm	5.93×10^5	Mohms/cm	5.93×10^5
Surface Resistivity	IPC-650 2.5.17.1 (after temp./humidity)	Mohms	4.97×10^5	Mohms	4.97×10^5
Flex Strength (MD)	ASTM D 790 (02)	psi	14,500	N/mm^2	99.97
Flex Strength (CD)	ASTM D 790 (02)	psi	7,650	N/mm^2	52.74
Thermal Conductivity	ASTM F 433	W/m-K	.43	W/m-K	.43
T_cK (-30 to 110° C)	IPC-650 2.5.5.5.1 (modified)	ppm/°C	-326	ppm/°C	-326
Dimensional Stability (MD)	IPC-650 2.4.39 (After Bake)	mil/in.	-0.5	mm/M	-0.5
Dimensional Stability (CD)	IPC-650 2.4.39 (After Bake)	mil/in.	-0.6	mm/M	-0.6
Dimensional Stability (MD)	IPC-650 2.4.39 (Thermal Stress)	mil/in.	-1.0	mm/M	-1.0
Dimensional Stability (CD)	IPC-650 2.4.39 (Thermal Stress)	mil/in.	-1.4	mm/M	-1.4
CTE (X axis) (25 -125° C)	IPC-650 2.4.41/TMA	ppm/°C	10	ppm/°C	10
CTE (Y axis) (25 -125° C)	IPC-650 2.4.41/TMA	ppm/°C	17	ppm/°C	17
CTE (Z axis) (25 -125° C)	IPC-650 2.4.41/TMA	ppm/°C	62	ppm/°C	62
Resin Flow	IPC-650 2.3.17	%	4.94	%	4.94

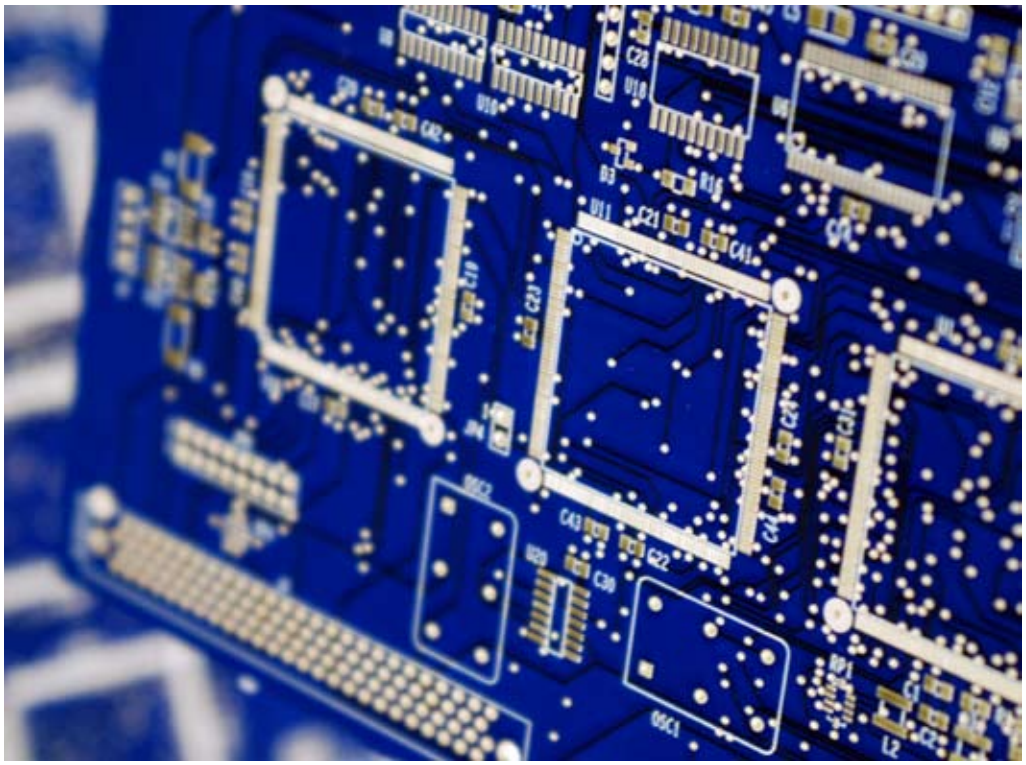
All reported values are typical and should not be used for specification purposes. In all instances, the user shall determine suitability in any given application.

*fast*Rise™ 77 Prepreg
Preliminary Data Sheet





Microsection of 6 copper layer multilayer containing RF-60A-0100 and *fast*Rise™ 77 prepreg (PWBs courtesy of Delta Circuits, Fairfield, NJ)



*PWB fabrication and development courtesy of Delta Circuits, Fairfield, NJ.
PWBs passed 5X lead free SMT assembly cycles with no defects; 100% electrical retest passed.

Notes for fabricating with *fast*Rise™ 77: These grades of *fast*Rise™ are lower flowing grades of the *fast*Rise™ prepreg series and care must be taken during lamination to avoid lamination voids caused by low pressure areas. *fast*Rise™ is shipped at a very low degree of cure. The best flow conditions are achieved when the prepreg spends the maximum amount of time possible at a temperature of 250ºF (121ºC) using the highest possible pressure. For difficult flow and fill designs, lamination should begin at 250ºF (121ºC) and held for 30-60 minutes at maximum pressure, followed by a slow 2.0-4.0Cº/min ramp rate to 216ºC (420ºF). These prepregs are not recommended for blind and buried via fill. Because of the large number of possible applications for the *fast*Rise™ prepreg series and the complexity of many multilayer printed circuit designs, Taconic does not warranty or guarantee the performance of *fast*Rise™ when combined with any supplier's core materials. It is the responsibility of the end user to determine the suitability of *fast*Rise™ with various core materials for each application.

RoHS WEEE Compliant

rev. 4/10