

# VT-47

UL Approval: E214381    Version: Rev. A4

## DATASHEETS - HIGH TG MATERIAL

VT-47 CCL/Laminate VT-47 PP/Prepreg ( UL family with VT-481)

### General Information

- High Tg FR-4 (Tg 180°C)
- Phenolic Cured System
- Excellent Thermal Reliability
- CAF Resistance
- UV Blocking
- Laser Fluorescing
- Low CTE

### Application

For Single Side\Double Side\ Multilayer PWB & Lead Free Assembly Applications.

### Availability

VT-47 Laminates are available in thickness from .002” to .200” and with the copper foil from 1/4oz to 12oz; Ventec can supply either reverse treated (RT) or double side treated copper foil. For cores ≤ .005”, it is recommended to use the reverse treated copper due to the low profile. The peel strength for RT foil is ≈1-2lbs/in (0.35Kg/m) less than Standard foil.

VT-47PP pre-pregs are available in many E-Glass styles, such as 7628, 7629, 1506, 1500, 2113, 2313, 3313, 2116, 1080, 1086, 1078, 106 & 1067.

### Storage Condition & Retest Time

		Prepreg		Laminate
Storage Condition	Temperature	Below 23°C (73°F)	Below 5°C (41°F)	Room
	Relative Humidity	Below 55% RH	/	/
Shelf Time*		3 Months	6 Months	12 Months (airproof)

\*The pre-preg exceeding shelf time should be retested.

## VT-47

## PROPERTIES SHEETS

## IPC-4101C Slash Sheet(s)/126(most compliant), / 21, /24, /26, /97, /98, /99, /101

Properties	Test Method	Units	Specification	Typical Value
<b>Thermal Properties</b>				
Glass Transition Temp. (Tg)				
DSC	IPC-TM-650 2.4.25	°C	–	–
TMA	IPC-TM-650 2.4.24	°C	170 minimum	180
Decomposition Temp. (Td) By TGA (at 5% weight loss)	ASTM D3850	°C	340 minimum	345
Time to Delamination---T260	IPC-TM-650 2.4.24.1	Minute	30 minimum	>60
Time to Delamination---T288	IPC-TM-650 2.4.24.1	Minute	15 minimum	<30
Z-axis CTE				
Before Tg	IPC-TM-650 2.4.24	ppm/°C	60 maximum	45
After Tg	IPC-TM-650 2.4.24	ppm/°C	300 maximum	200
Total Expansion (50–260°C)	IPC-TM-650 2.4.24	%	3.0 maximum	2.6
Thermal Stress @ 288°C	IPC-TM-650 2.4.13.1	Second	Pass 10s	>600
<b>Electrical Properties</b>				
Dielectric Constant @ 1GHz	IPC-TM-650 5.5.5.9	–	5.2 maximum	4.3
Dissipation Factor @ 1GHz	IPC-TM-650 5.5.5.9	–	0.035 minimum	0.015
Volume Resistivity				
After Moisture Resistance	IPC-TM-650 2.5.17.1	MΩ-cm	10 <sup>4</sup> minimum	5*10 <sup>8</sup>
E-24/125	IPC-TM-650 2.5.17.1	MΩ-cm	10 <sup>3</sup> minimum	5*10 <sup>6</sup>
Surface Resistivity				
After Moisture Resistance	IPC-TM-650 2.5.17.1	MΩ	10 <sup>4</sup> minimum	5*10 <sup>7</sup>
E24/125	IPC-TM-650 2.5.17.1	MΩ	10 <sup>3</sup> minimum	5*10 <sup>6</sup>
Electrical Strength	IPC-TM-650 2.5.6.2	Volt/mil (KV/mm)	762 (30) minimum	1200~1400 (54)
Dielectric Breakdown	IPC-TM-650 2.5.6	KV	40 minimum	60
Comparative Tracking Index (CTI)	ASTM D3638	Rating (Volt)	–	Grade 3 (175~250)
Arc Resistance	IPC-TM-650 2.5.1	Second	60 minimum	124
<b>Mechanical Properties</b>				
Peel Strength (1oz)				
As received	IPC-TM-650 2.4.8	lb/in (N/mm)	–	7.5~10 (1.3~1.75)
After thermal stress	IPC-TM-650 2.4.8	lb/in (N/mm)	6 (1.05) minimum	7.5~10 (1.3~1.75)
Flexural Strength				
Warp	IPC-TM-650 2.4.4	Kpsi (MPa)	60 (415) minimum	72 (500)
Fill	IPC-TM-650 2.4.4	Kpsi (MPa)	50 (345) minimum	61 (420)
<b>Physical Properties</b>				
Moisture Absorption	IPC-TM-650 2.6.2.1	%	0.80 maximum	0.12
Thermal Conductivity	ISO22007-2	W/M·K	–	0.5
Flammability	UL-94	Rating	V0 minimum	V0

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

## VT-47

## PROCESS GUIDELINE

## Press Condition

1. Heating rate (Rise of Rate) of material [Material Temperature]:  
Programmable Press: 1.5-3.0°C/min (3-5°F/min). Manual Press :3-6°C /min (5-10°F/min)
2. Curing Temperature & Time: >60min at more than 185°C (365°F) [Material Temperature]
3. Full Pressure: ≥300psi
4. Vacuuming should be continued until over 140°C (284°F) [Material Temperature]

## Typical Drilling Parameters (φ0.3-1.0 mm)

1. Spindle Speed:	120-180	KRPM
2. Feed Rate:	120-220	inch / min
3. Retract Rate:	596-1000	inch / min
4. Chip Load:	0.6~2.0	mil / Rev.

The use of undercut drill bits has yielded better quality on smaller holes. Check with your drill supplier for more information.

## Desmearing Process

Desmear rate of **VT-47** is less than that of the conventional FR-4;  
 Minor adjustments to the desmear process may be necessary for the higher Tg materials;  
 Check with your chemical supplier for recommendations.