



# VT-47

UL Approval: E214381

Version : Rev. 5

## Datasheets

## High Tg Material

VT-47RD/TC/Laminate VT-47PP/Prepreg

### 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

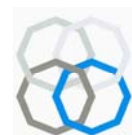
VT-47TC Laminates are available in thickness from .002”to .200” and with the copper foil from 1/4oz to 12oz; Ventec can supply either reverse treated (RT) or double side treated copper foil. For cores  $\leq .005$ ”, it is recommended to use the reverse treated copper due to the low profile. The peel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



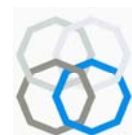
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Properties Sheet: IPC-4101B Specification Sheet(s)/21, 24, 26, 97, 98, 99, 101, 121,124,126,129

(Test Sample: .036"1/1)

Test Item		Test Condition (IPC-TM-650 or As Noted)	Unit	Specification (IPC-4101 B)	Typical Value	
					VT-47	Normal FR-4
Flexural Strength	Warp	2.4.4	MPa	>415	500	600
	Fill			>345	420	500
Peel Strength (1 oz)	As received	2.4.8	Lb/in	6.0 min	7.5~10	10~12
	After thermal stress				7.5~10	9~12
Glass Transition Temp. (Tg)	DSC	2.4.25	°C	—	170~185	136~140
	DMA	2.4.24.4	°C	—	185~195	145~155
Decomposition Temp. (Td) By TGA (@5% weight loss)		ASTM D3850	°C	—	345	290~310
X/Y -axis C.T.E.		TMA	PPM/°C	—	11~13	12~15
Z-axis C.T.E.	Before Tg	TMA	PPM/°C	≤60	35	50
	After Tg			≤300	190	250
Z-axis	50→260°C	TMA	%	≤3.5	3.0	3.5~4.0
Total Expansion	50→288°C	TMA	%	—	3.0~3.5	4.0~5.0
Moisture	D-24/23	2.6.21	%	0.35 max	0.10~0.16	0.25
Absorption	After PCT	1atm.,121°C,1hour	%	—	0.20	0.28
Volume Resistivity	After Moisture	2.5.17.1	MΩ-cm	≥10 <sup>6</sup>	5×10 <sup>8</sup>	5×10 <sup>8</sup>
	E-24/125			≥10 <sup>3</sup>	5×10 <sup>6</sup>	5×10 <sup>6</sup>
Surface Resistivity	After Moisture	2.5.17.1	MΩ	≥10 <sup>4</sup>	5×10 <sup>7</sup>	5×10 <sup>7</sup>
	E-24/125			≥10 <sup>3</sup>	5×10 <sup>6</sup>	5×10 <sup>6</sup>
Electric Strength		2.5.6.2	KV/mm	≥30	54	54
Dielectric Breakdown		2.5.6	KV	≥40	>50	>50
Arc Resistance		2.5.1	Second	≥60	124	65
Dielectric Constant (Dk)	1.0 MHz	2.5.5.3,	—	5.4 max.	4.2~4.6	4.42
	1.0 GHz	2.5.5.9,			4.1~4.5	4.39
	2.0 GHz	2.5.5.5			4.0~4.3	4.38
Dispersion Factor (Df)	1.0 MHz	2.5.5.3,	—	0.035 max.	0.015~0.020	0.022
	1.0 GHz	2.5.5.9,			0.015~0.018	0.022
	2.0 GHz	2.5.5.5			0.016~0.020	0.021
Thermal Stress	288°C Solder Dip	2.4.13.1	Second	60	>300	90~120
Pressure Cook Test		Pre-treat15psi/30min; 288°C,10Sec/cycle	Cycle	2 Cycles Min.	10~12	6~8
Time to Delamination---T260		2.4.24.1	Minute	≥30	>60	20
Time to Delamination---T288		2.4.24.1	Minute	≥5	>20	3
Flammability		UL94	—	V1	V0	V0
Comparative Tracking Index(CTI)		UL-7461 ASTM D3638	Volt	—	175~250 (Grade 3)	175~250 (Grade 3)
Anti-CAF		85°C, RH85%; Bias Voltage: 100 V; [IPC-TM-650 2.6.25]	Hour	Insulation Resistance over 100MΩ; Pass 1000Hrs	Pass 1000	—

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



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## Process Guideline

### Press Condition

1. Heating rate(Rate of Rise) of material:

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: ≥250-300psi

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.