



VT-441

UL Approval: E214381

Version : Rev. 4

Datasheet

Halogen Free

VT-441TC/Laminate VT-441PP/Prepreg

General Information

- **Halogen Free** & Phenolic Cured System
- Middle Tg (150°C) FR-4
- UV Blocking
- Laser Fluorescing
- **CAF Resistance**
- Low CTE
- Excellent Thermal Reliability

Application

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

Availability

VT-441TC 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-441PP 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 & Shelf Life

		Prepreg		Laminate
Storage	Temperature	Below 23°C(73°F)	Below 5°C(41°F)	Room
Condition	Relative Humidity	Below 50%RH	/	/
Retest Time*		3 Months	6 Months	12Months(airproof)

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



VT-441

Properties Sheet: IPC-4101B Specification Sheet(s)/94

(Test Sample: .036"1/1)

Test Item		Test Condition	Unit	Specification	Test Result	
					VT-441	Normal FR4
Flexural Strength	Warp	As Recieved	MPa	>415	500	600
	Fill				>345	400
Peel Strength (for 1 oz)		As Recieved	Lb/in	6.0min	8.30	10~12
		After Heated			8.21	9~12
Glass Transition (Tg)	TMA	2.4.24	°C	—	146	125~135
	DSC	2.4.25	°C	—	152	136~140
	DMA	2.4.24C	°C	—	165	145~155
Decomposition Temp. (Td)		ASTM D3850	°C	—	340	290~310
Z-axis C.T.E Before Tg/After Tg		TMA	ppm/°C	60 /300	38 /190	50 /250
Moisture Absorption		D-24/23	%	0.35max	0.18	0.25
Volume Resistance	After Moisture	2.5.17.1	MΩ-cm	≥10 ⁶	5×10 ⁸	5×10 ⁸
	E-24/125				≥10 ³	5×10 ⁶
Surface Resistance	After Moisture	2.5.17.1	MΩ	≥10 ⁴	5×10 ⁷	5×10 ⁷
	E-24/125				≥10 ³	5×10 ⁶
Electric Strength		2.5.6.2	KV/mm	≥30	54	54
Dielectric Constant (Dk)	250MHZ	C24/23/50	—	5.4max	4.62	4.42
	750MHZ				4.57	4.39
	1.0 GHz				4.57	4.38
	2.0 GHz				4.47	4.36
	10 GHz				4.43	4.30
Dispersion Factor (Df)	250MHZ	C24/23/50	—	0.035max	0.014	0.022
	750MHZ				0.014	0.021
	1.0 GHz				0.014	0.021
	2.0 GHz				0.015	0.020
	10 GHz				0.016	0.022
Thermal Stress		Solder Dip @288°C	Sec	60 Sec	>300	90~120
Pressure Cook Test		15psi/30min /288 °C /10sec	Cycle	2 Cycles min.	10~12	6~8
Time to Delamination---T260		TMA	Minute	—	>60	20
Time to Delamination---T288		TMA	Minute	—	20	3
Halogen Content		—	ppm	<900	<900	—
Flammability		UL94	—	V0	V0	V0
Comparative Tracking Index (CTI)		UL-7461 ASTM D3638	Volt	—	175~250 (Grade 3)	175~250 (Grade 3)
Chemical Resistance in 10% NaOH,60°C,30minutes		—	—	No measles	No	No

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



VT-441

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: >50min at more than 180°C(356°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.

Desmearing Process

Desmear rate of **VT-441** 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.