

VT-461

UL Approval: E214381

Version : Rev. 7

Datasheets

Low Dk Material

VT-461TC/Laminate VT-461PP/Prepreg

General Information

- **Low Dk & Low Transmission Loss**
- **High Tg (Tg200) & Non-Dicy System**
- Excellent Thermal Reliability
- UV Blocking;
- Laser Fluorescing;
- Low CTE

Application

For Single Side\Double Side\ Multilayer PWB 、 High layer account、 High Speed Products、 Substrate & Lead Free Assembly Applications;

Availability

VT-461TC Laminates are available in thickness from .002" to .200" and with the copper foil from 1/4 oz to 12 oz; 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-461PP 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	Temperature	Below 23°C(73°F)	Below 5°C(41°F)	Room
Condition	Relative Humidity	Below 55%RH	/	/
Shelf Time*		3 Months	6 Months	12 Months(airproof)

The pre-preg exceeding shelf time should be retested.



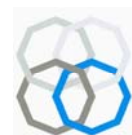
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Properties Sheet: IPC-4101B Specification Sheet(s)/121,124,129

(Test sample: 1.0mm 1/1)

Test Item		Test Condition (IPC-TM-650 or As Noted)	Unit	Specification (IPC-4101 B)	Typical Value	
					VT-461	Normal FR-4
Flexural Strength	Warp	2.4.4	MPa	>415	560	600
	Fill			>345	450	500
Peel Strength (1 oz)	Low profile foil	2.4.8	1b/in	—	5.70	8.59
	HP type foil			—	8.00	11.00
Glass Transition Temp.(Tg)	TMA	2.4.24C	°C	—	200	125~135
	DMA	2.4.25	°C	—	235	145~155
Decomposition Temp. (TD) by TGA (@5% weight loss)		ASTM D3850	°C	—	365	290~310
Z-axis C.T.E.	Before Tg	TMA	ppm/ °C	<60	45	50
	After Tg			<300	235	250
Young's Modulus	Horizontal	ASTM D3039	GPa	—	25	24
Moisture Absorption	D-24/23	2.6.21	%	0.35 max	0.12	0.25
	After PCT	1atm.,121°C, 1hour	%	—	0.20	0.28
Volume Resistivity	After Moisture	2.5.17.1	MΩ-cm	≥10 ⁶	5×10 ⁸	5×10 ⁸
	E-24/125			≥10 ³	5×10 ⁶	5×10 ⁶
Surface Resistivity	After Moisture	2.5.17.1	MΩ	≥10 ⁴	5×10 ⁷	5×10 ⁷
	E-24/125			≥10 ³	5×10 ⁶	5×10 ⁶
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 (R/C 50%)	1 GHz	2.5.5.9,	—	5.4 max	3.80	4.39
	2 GHz				2.5.5.5	3.77
	10 GHz	—			3.66	—
Dispersion Factor (R/C 50%)	1 GHz	2.5.5.9,	—	0.035 max	0.009~0.011	0.022
	2 GHz	2.5.5.5			0.008~0.010	0.021
	10 GHz	—			0.007~0.010	—
	10 GHz	Split post cavity			0.005~0.007	—
Thermal Stress	288°C Solder Dip	2.4.13.1	Sec.	60 Sec.	>300	90~120
Pressure Cook Test		15psi/30min/ 288°C/10Sec.	Cycle	2 Cycles min.	14~18	6~8
Time to Delamination---T260		2.4.24.1	Min.	≥30	>60	18
Time to Delamination---T288		2.4.24.1	Min.	≥5	>30	—
Flammability		UL94	—	V1	V0	V0
Comparative Tracking Index (CTI)		UL-7461 ASTM D3638	Volt	—	175~250 (Grade 3)	175~250 (Grade 3)

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



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Properties Sheet: Dielectric Characteristics

TEST ITEM	CONDITION	UNIT	Low loss material		
			VT-461	N4000-13EP	FR-408
Tg	TMA	°C	200	200	170
Decomposition	ASTM D3850	°C	350	365	350
Thermal Stress	Sold Dip@288 °C	sec	>300	/	>300
T288	TMA	minutes	>30	/	/
Z-CTE	50-260 °C	%	2.2~2.8%	2.2~2.8%	2.5~3.0%
X,Y-CTE	Before Tg	ppm/°C	11	11	12

Test Item	Condition	Sample Construction	Dielectric Constant		
			VT-461	N4000-13EP	FR-408
250MHz	C24/23/50	2116 RC50%×1	3.82	/	/
1.0 GHz			3.80	3.70	3.60
2.0 GHz			3.77	3.70	3.65
5.0 GHz			3.75	3.60	3.60
10.0 GHz			3.66	3.50	3.60

Test Item	Condition	Sample Construction	Dispersion Factor		
			VT-461	N4000-13EP	FR-408
250MHz	C24/23/50	2116 RC50%×1	0.011~0.013	/	/
1.0 GHz			0.009~0.011	0.010	0.011
2.0 GHz			0.008~0.010	0.009	0.011
5.0 GHz			0.007~0.010	/	0.011
10.0 GHz			0.007~0.010	0.008	0.011
10.0 GHz <i>(Split post cavity)</i>			0.005~0.007	/	0.011



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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: ≥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-461** is less than that of the conventional FR-4;
Adjustments to the desmear process may be necessary for the higher Tg materials;
Check with your chemical supplier for recommendations.