

VT-447C

PROCESS GUIDE

Laminate/Prepreg

UL Approval: E214381 Version: 24/12/2024

Precautions in Handling

- Please consider resin filling when single ply of 1080 prepreg is designed to the dielectric layer.
- **VT-447C** has weaker thermal resistance than regular **VT-447**. Please be very careful when 8L and higher layer count is designed or dielectric with single ply of 1080.
- **VT-447C** Dk is a little higher than **VT-447**. Please take it into consideration whenever impedance control is required.
- In order to satisfy CTI≥600V, 1 ply 2116 and 7628 or 2ply1080 is suggested to be used for outer layer.
- Please note that the surface roughness and clearness affects CTI rating.

Storage Condition & Shelf Life

		Prepreg		Laminate
Storage Condition	Temperature	Below 23°C (73°F)	Below 5°C (41°F)	Room
	Relative Humidity	Below 55%	/	/
Shelf Life		3 Months	6 Months	24 Months

- The prepreg exceeding shelf time should be retested.
- Take care in handling thin core laminates as they are easily damaged.
- If the prepreg is not consumed within 48hrs after opening the vacuum package, it is recommended that the bags be resealed.
- Material is available in both long and short grain. The grain direction is indicated on the label with an arrow.

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Prepreg Availability

G/F Type	Resin Content	Press Thickness (mil)	Dk				Df			
			@ 1GHz	@ 2GHz	@ 5GHz	@ 10GHz	@ 1GHz	@ 2GHz	@ 5GHz	@ 10GHz
7628	50%	8.0	4.6	4.6	4.5	4.5	0.011	0.011	0.012	0.012
7628	46%	7.5	4.6	4.6	4.5	4.5	0.011	0.011	0.012	0.012
2116	60%	5.4	4.5	4.5	4.4	4.4	0.012	0.012	0.013	0.013
2116	58%	5.0	4.5	4.5	4.4	4.4	0.012	0.012	0.013	0.013
1080	68%	3.1	4.3	4.3	4.2	4.2	0.012	0.012	0.013	0.013

In order to satisfy CTI>600V, 1 ply 2116 and 7628 or 2ply1080 is suggested to be used for outer layer.

Remark: More types available upon request

Laminate Availability

Core Thickness		Stack-up	Resin Content	Dk				Df			
mm	inches			@ 1GHz	@ 2GHz	@ 5GHz	@ 10GHz	@ 1GHz	@ 2GHz	@ 5GHz	@ 10GHz
0.100	0.004	1-2113	57%	4.5	4.5	4.4	4.4	0.012	0.012	0.013	0.013
0.125	0.005	1-2116	55%	4.5	4.5	4.4	4.4	0.012	0.012	0.013	0.013
0.20	0.008	2-2113	57%	4.5	4.5	4.4	4.4	0.012	0.012	0.013	0.013
0.20	0.008	1-7628	50%	4.6	4.6	4.5	4.5	0.011	0.011	0.012	0.012
0.25	0.010	2-2116	55%	4.5	4.5	4.4	4.4	0.012	0.012	0.013	0.013
0.30	0.012	2-1506	46%	4.6	4.6	4.5	4.5	0.011	0.011	0.012	0.012
0.30	0.012	3-2113	57%	4.5	4.5	4.4	4.4	0.012	0.012	0.013	0.013
0.38	0.015	2-7628	46%	4.6	4.6	4.5	4.5	0.011	0.011	0.012	0.012
0.76	0.030	4-7628	46%	4.6	4.6	4.5	4.5	0.011	0.011	0.012	0.012
1.50	0.060	8-7628	46%	4.6	4.6	4.5	4.5	0.011	0.011	0.012	0.012
2.80	0.110	15-7628	46%	4.6	4.6	4.5	4.5	0.011	0.011	0.012	0.012

Remark:

- 1) Copper foil: Hoz~6oz
- 2) More types available upon request
- 3) In order to satisfy CTI>600V please don't design 0.10mm in outer layer

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Baking Cycles During PCB Fabrication

There are a few baking cycles during PCB fabrication. Please take into consideration when appropriate.

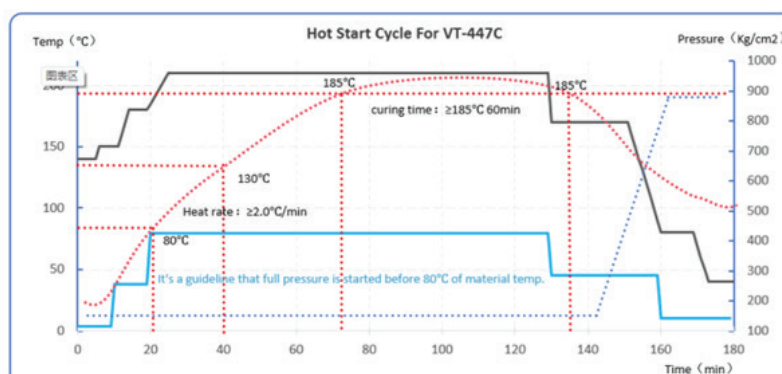
Process	Purpose	Cycle
After Cutting (for thin core below 10 mil)	To get a stable dimension; To eliminate moisture	2~4 hours @ 150°C
Before Drill	To get a stable dimension or full cure	1 hour @ 150°C
Before HASL	To eliminate moisture	2 hours @ 125°C
After Routing	To get a stable dimension	1 hour @ 150°C
Before OSP	To prevent solder mask shelling	1 hour @ 140°C
Before shipment (stored for over 3 months)	To eliminate moisture	2~4 hours @ 105°C

- Dimension stability is the better than Standard FR4 material.
- For unclad or single sided laminates to be used in multilayer, please brush unclad sides before use.
- Please check with your oxide vendor to make sure that our material is suitable with your oxide process. We recommend to control the peel strength with brown oxide copper over 2 Lb/in.
- After oxide, it is preferred to press them within 12 hours. Anyhow, not more than 24 hours.

Pressing

Item	Hot Start Press
Rate of Rise	≥2.0°C/min
Cure Time	≥185°C 60~90min
Max Temperature	200~205°C
Full Pressure	≥300 PSI
Temperature to Apply Full Pressure Vacuuming should be continued until over 140°C [Material Temperature]	≤80°C

Typical Press Cycle



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Typical Drilling Condition

Diameter	Stack Height	Spindle (KRPM)	Infeed (mm/s)	Retract (mm/s)	Hit Count
0.25mm	1 PNL/Stack	130	38	300	800
0.30mm	1 PNL/Stack	130	38	300	800
0.60mm	1 PNL/Stack	80	43	300	800

1. Excessive wear of carbide drill bits. Diamond coated drill bits preferred;
2. LE Aluminum sheet and white phenolic entry board are preferred;

Desmear Process

The de-smearing rate of **VT-447C** is less than regular **VT-447**. 1 time vertical de-smearing is preferred.

Please examine hole wall to check de-smearing effect.

Typical de-smearing rate for reference only:

1x De-smearing	Supplier	Chemical
0.27mg/cm ²	Atotech	Alkaline Permanganate