

VT-481

UL Approval: E214381 Version: 12/02/2025

PROCESS GUIDE

VT-481 CCL/Laminate VT-481 PP/Prepreg

Precautions in Handling

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.

Designing and Inner layer Process

- Please be careful when single ply of 1080, 1086, 1078 or 106 prepreg is designed to the dielectric layer.
- Dimension stability is same as Normal FR4 material
- 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.
- For unclad or single sided laminates to be used in multilayer, please brush unclad sides before use.

VT-481

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PROCESS GUIDE

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Prepreg Availability

E-Glass styles: 7628, 1506, 1500, 2113, 2313, 3313, 2116, 1080, 1086, 1078, 106, 1067 etc.

PP Type	Resin Content	Press Thickness (mil)	DK				DF				Remark
			@ 1GHz	@ 2GHz	@ 5GHz	@ 10GHz	@ 1GHz	@ 2GHz	@ 5GHz	@ 10GHz	
7628	48%	8.0	4.30	4.25	4.20	4.20	0.014	0.014	0.015	0.016	Standard
7628	46%	7.6	4.34	4.29	4.24	4.24	0.014	0.014	0.015	0.016	Standard
1506	52%	7.1	4.21	4.16	4.11	4.11	0.015	0.015	0.016	0.017	Standard
2116	55%	4.8	4.13	4.05	4.00	4.00	0.015	0.015	0.016	0.017	Standard
2116	52%	4.5	4.21	4.16	4.11	4.11	0.015	0.015	0.016	0.017	Standard
2113	57%	3.8	4.08	4.03	3.98	3.98	0.016	0.016	0.017	0.018	Standard
1080	68%	3.3	3.81	3.76	3.71	3.71	0.018	0.018	0.019	0.020	Standard
1080	66%	3.1	3.87	3.82	3.77	3.77	0.017	0.017	0.018	0.019	Standard
106	76%	2.4	3.55	3.50	3.45	3.45	0.019	0.019	0.020	0.021	Standard

Remark:

- ① Press thickness test condition---Prepreg lamination size 18"*24", Copper Foil---1oz/1oz, Flow---about 5%;
- ② Make laminated prepreg to micro-section and measure the thickness with microscope; this thickness is used for resistance design calculation.
- ③ The thickness measured with micrometer is 0.2~0.4 mil larger than that measured with micro-section; and mainly used for total thickness design calculation.

VT-481

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Laminates Availability

- Thickness: 0.002" (0.05mm) to 0.200" (5mm), available in sheet or panel form
- Copper Foil: 1/4 to 12oz, HTE or RTF or DST

DK values are for impedance design.

Core thk. (inches)	Stack-up	Resin Content	DK				DF				Remark
			@ 1GHz	@ 2GHz	@ 5GHz	@ 10GHz	@ 1GHz	@ 2GHz	@ 5GHz	@ 10GHz	
0.002	1-1067	66%	3.87	3.82	3.77	3.77	0.017	0.017	0.018	0.019	Preferred
0.002	1-106	72%	3.70	3.65	3.60	3.60	0.018	0.018	0.019	0.020	Standard
0.003	1-2112	50%	4.23	4.18	4.13	4.13	0.015	0.015	0.016	0.017	Preferred
0.003	1-1080	66%	3.87	3.82	3.77	3.77	0.017	0.017	0.018	0.019	Standard
0.004	1-2116	46%	4.30	4.25	4.20	4.20	0.014	0.014	0.015	0.016	Standard
0.004	2-1067	66%	3.87	3.82	3.77	3.77	0.017	0.017	0.018	0.019	2ply Preferred
0.004	2-106	72%	3.70	3.65	3.60	3.60	0.018	0.018	0.019	0.020	2ply
0.005	1-2116	55%	4.13	4.05	4.00	4.00	0.015	0.015	0.016	0.017	Standard
0.006	1-1506	45%	4.35	4.30	4.25	4.25	0.014	0.014	0.015	0.016	Standard
0.007	1-7628	41%	4.45	4.38	4.30	4.30	0.014	0.014	0.015	0.016	Standard
0.008	1-7628	46%	4.30	4.25	4.20	4.20	0.014	0.014	0.015	0.016	Standard
0.008	2-2116	46%	4.30	4.25	4.20	4.20	0.014	0.014	0.015	0.016	2ply
0.010	2-2116	55%	4.13	4.05	4.00	4.00	0.015	0.015	0.016	0.017	Standard
0.012	2-1506	45%	4.35	4.30	4.25	4.25	0.014	0.014	0.015	0.016	Standard
0.014	2-7628	41%	4.45	4.38	4.30	4.30	0.014	0.014	0.015	0.016	Standard
0.016	2-7628	46%	4.30	4.25	4.20	4.20	0.014	0.014	0.015	0.016	Standard
0.018	2-7628+ 1-1080	47%	4.27	4.22	4.17	4.17	0.014	0.014	0.015	0.016	Standard
0.020	2-7628+ 1-2116	46%	4.30	4.25	4.20	4.20	0.014	0.014	0.015	0.016	Standard
0.024	3-7628	42%	4.43	4.36	4.29	4.29	0.014	0.014	0.015	0.016	Standard
0.028	4-7628	41%	4.45	4.38	4.30	4.30	0.014	0.014	0.015	0.016	Standard
0.036	5-7628	43%	4.41	4.35	4.28	4.28	0.014	0.014	0.015	0.016	Standard
0.039	5-7628	43%	4.41	4.35	4.28	4.28	0.014	0.014	0.015	0.016	Standard
0.042	6-7628	42%	4.43	4.36	4.29	4.29	0.014	0.014	0.015	0.016	Standard
0.045	6-7628	46%	4.30	4.25	4.20	4.20	0.014	0.014	0.015	0.016	Standard
0.049	7-7628	41%	4.45	4.38	4.30	4.30	0.014	0.014	0.015	0.016	Standard
0.059	8-7628	44%	4.38	4.32	4.25	4.25	0.014	0.014	0.015	0.016	Standard

VT-481

PROCESS GUIDE

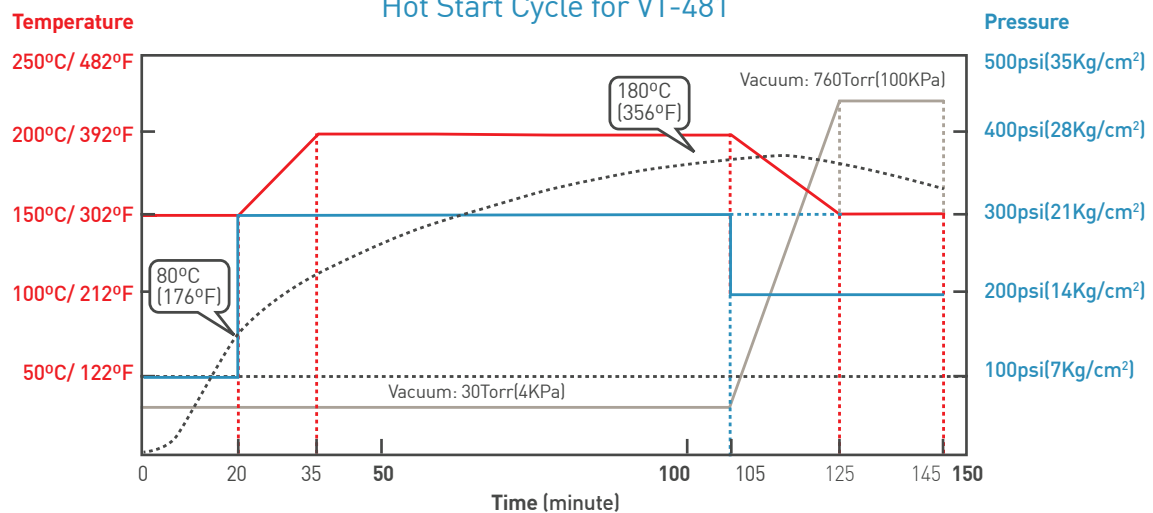
UL Approval: E214381 Version: 12/02/2025

VT-481 CCL/Laminate VT-481 PP/Prepreg

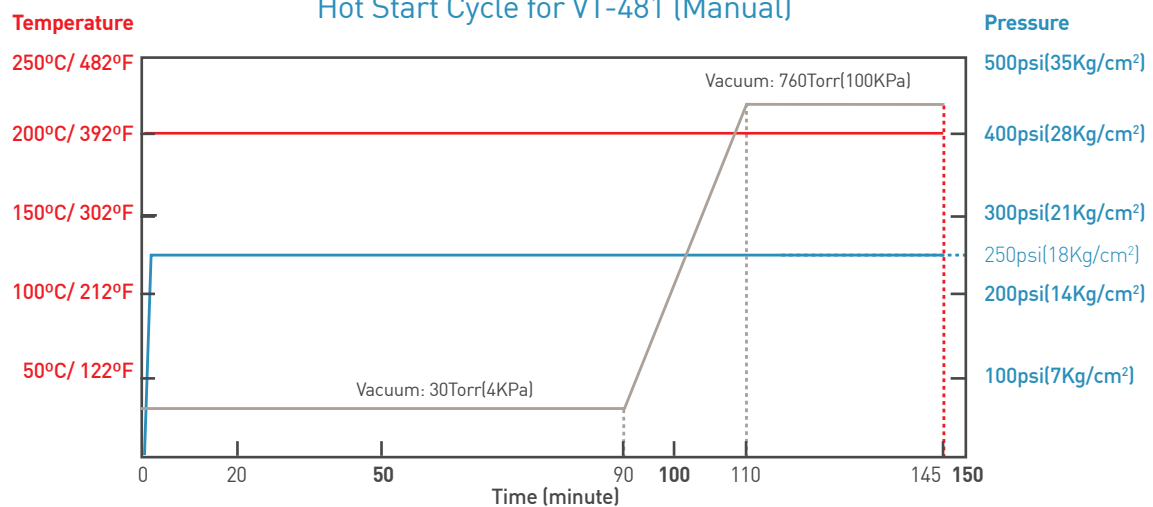
Press Condition

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 180°C (365°F); [Material Temperature].
3. Full Pressure: ≥250-300psi
4. Vacuuming should be continued until over 140°C (284°F) [Material Temperature]
5. Cold Press condition: Keep Plate @ Room Temperature by water; Pressure: 100psi; Keep Time: 60minutes

Hot Start Cycle for VT-481



Hot Start Cycle for VT-481 (Manual)

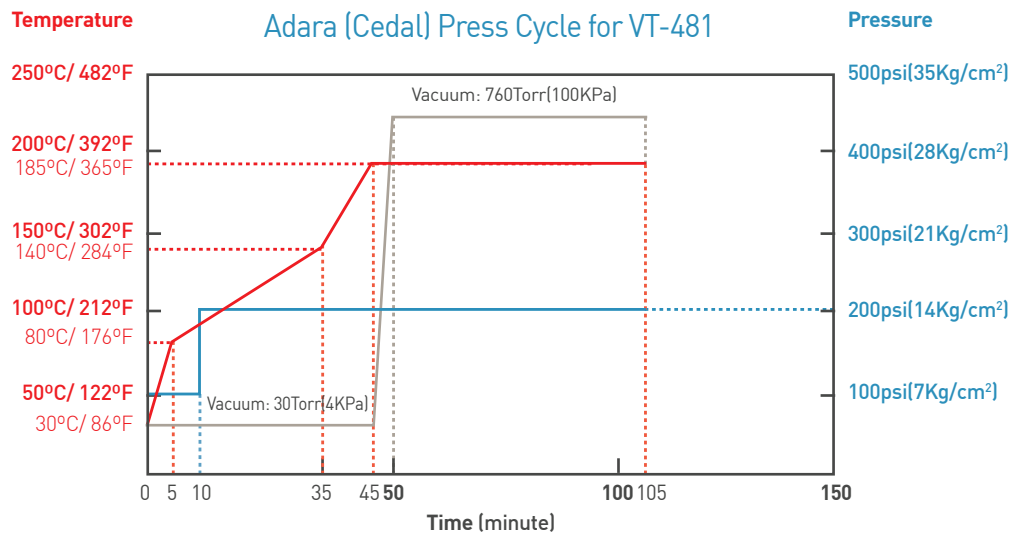


VT-481

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Typical Drilling Parameters

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

Hole Size (mm)	Spindle Speed (KRPM)	Feed Rate (IPM)	Retract Rate (IPM)	Remark (Mil/Rev)
0.20~0.25	150	110	700	0.73
0.30~0.35	150	130	700	0.87
0.40~0.55	120	130	900	1.08
0.60~0.65	80	80	900	1.00
0.70~1.00	70	80	900	1.14
1.10~1.25	60	80	900	1.33
1.30~1.35	55	80	900	1.45
1.40~1.45	50	80	600	1.60
1.50~1.80	45	80	600	1.78
2.05~3.00	30	80	500	2.67

Desmearing Process

1. Desmear rate of **VT-481** is less than that of the conventional FR4;
2. Adjustments to the desmear process are necessary for the lead-free materials;
3. Check with your chemical supplier for recommendations.

Packaging and baking recommendation

- It is recommended to bake the board before packaging at 125°C/4~8h to avoid moisture causing a decrease in heat resistance.
- If the PCBs needs to be stored for a long time before use, it is recommended to use aluminum foil vacuum packaging.
- If exceed 3 months after packaging , It is best to bake the PCBs at 125°C/4~6h before use.