

VT-441

UL Approval: E214381 Version: 13/02/2025

PROCESS GUIDE

VT-441 CCL/Laminate VT-441 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 the same as Standard 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.

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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	45%	7.50	4.35	4.30	4.25	4.25	0.012	0.013	0.013	0.014	Standard
1506	52%	7.20	4.15	4.10	4.05	4.05	0.013	0.014	0.014	0.015	Standard
2116	58%	5.20	3.98	3.93	3.88	3.88	0.013	0.014	0.014	0.015	Standard
2116	54%	4.70	4.10	4.05	4.00	4.00	0.013	0.014	0.014	0.015	Standard
2116	52%	4.50	4.15	4.10	4.05	4.05	0.013	0.014	0.014	0.015	Standard
2113	57%	4.10	4.00	3.95	3.90	3.90	0.013	0.014	0.014	0.015	Standard
1080	68%	3.20	3.80	3.73	3.68	3.68	0.014	0.015	0.015	0.016	Standard
1080	66%	3.00	3.83	3.76	3.70	3.70	0.014	0.015	0.015	0.016	Standard
1078	65%	3.00	3.83	3.76	3.70	3.70	0.014	0.015	0.015	0.016	Standard
1067	73%	2.70	3.72	3.62	3.56	3.56	0.015	0.016	0.016	0.017	Standard
106	76%	2.30	3.68	3.58	3.50	3.50	0.016	0.017	0.017	0.018	Standard
1037	72%	2.00	3.77	3.68	3.63	3.63	0.015	0.016	0.016	0.017	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.

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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

Note: For cores ≤ .005”, it is recommended to use the reverse treated copper due to the low profile. The peel strength for RT foil is 1-2lb/in (0.35Kg/m) less than Standard foil.

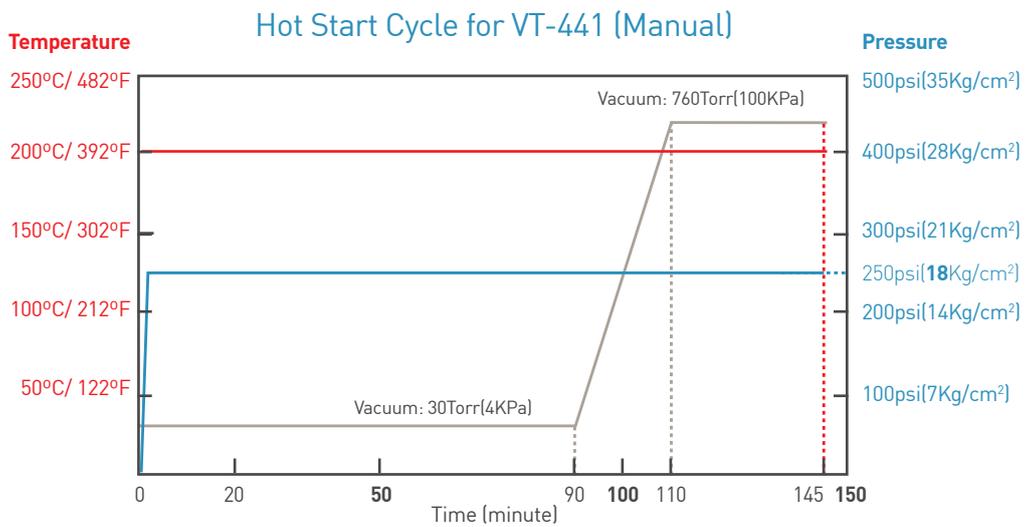
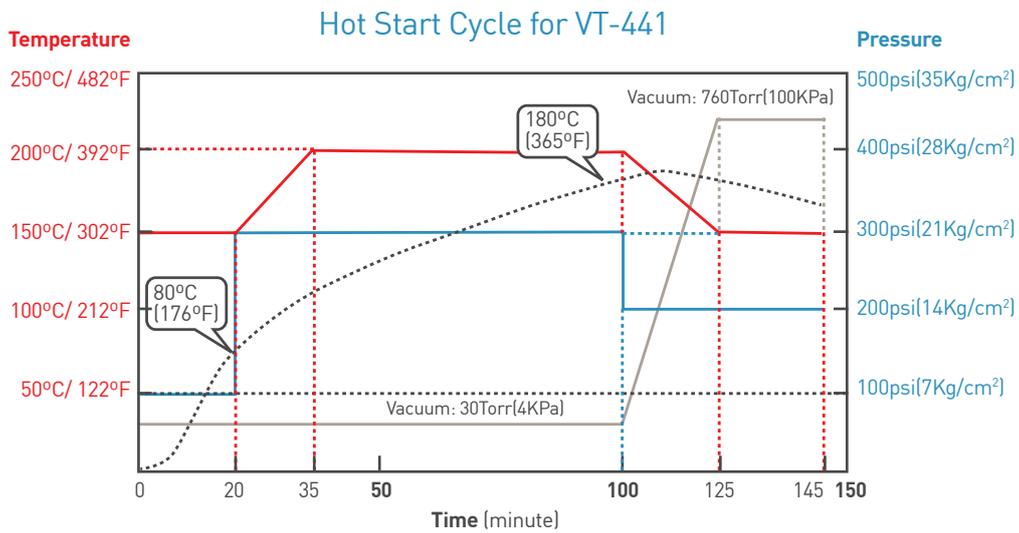
Core thk. (Inches)	Stack-up	Resin Content	DK				DF				Remark
			@ 1GHz	@ 2GHz	@ 5GHz	@ 10GHz	@ 1GHz	@ 2GHz	@ 5GHz	@ 10GHz	
0.0015	1-1027	70%	3.77	3.67	3.60	3.60	0.015	0.016	0.016	0.017	Standard
0.002	1-1037	72%	3.73	3.63	3.58	3.58	0.015	0.016	0.016	0.017	Non-standard
0.002	1-1067	66%	3.83	3.73	3.68	3.68	0.014	0.015	0.015	0.016	Preferred
0.002	1-106	72%	3.73	3.63	3.58	3.58	0.015	0.016	0.016	0.017	Standard
0.003	1-2112	52%	4.15	4.10	4.05	4.05	0.013	0.014	0.014	0.015	Preferred
0.003	1-1080	66%	3.83	3.73	3.68	3.68	0.014	0.015	0.015	0.016	Standard
0.004	1-2116	46%	4.35	4.30	4.25	4.20	0.013	0.014	0.014	0.015	Standard
0.004	2-1067	66%	3.83	3.73	3.68	3.68	0.014	0.015	0.015	0.016	2ply Preferred
0.004	2-106	72%	3.73	3.63	3.58	3.58	0.015	0.016	0.016	0.017	2ply
0.005	1-2116	55%	4.05	4.00	3.95	3.95	0.013	0.014	0.014	0.015	Standard
0.006	1-1506	45%	4.35	4.30	4.25	4.20	0.012	0.013	0.013	0.014	Standard
0.007	1-7628	41%	4.50	4.45	4.40	4.40	0.012	0.013	0.013	0.014	Standard
0.008	1-7628	46%	4.35	4.30	4.25	4.25	0.012	0.013	0.013	0.014	Standard
0.008	2-2116	46%	4.35	4.30	4.25	4.25	0.012	0.013	0.013	0.014	2ply
0.010	2-2116	55%	4.05	4.00	3.95	3.95	0.013	0.014	0.014	0.015	Standard
0.012	2-1506	45%	4.35	4.30	4.25	4.25	0.012	0.013	0.013	0.014	Standard
0.014	2-7628	41%	4.50	4.45	4.40	4.40	0.012	0.013	0.013	0.014	Standard
0.016	2-7628	46%	4.35	4.30	4.22	4.22	0.012	0.013	0.013	0.014	Standard
0.028	4-7628	41%	4.50	4.45	4.40	4.40	0.012	0.013	0.013	0.014	Standard
0.036	5-7628	43%	4.40	4.35	4.30	4.30	0.012	0.013	0.013	0.014	Standard
0.045	6-7628	46%	4.35	4.30	4.25	4.25	0.012	0.013	0.013	0.014	Standard
0.049	7-7628	41%	4.50	4.45	4.40	4.40	0.012	0.013	0.013	0.014	Standard
0.059	8-7628	44%	4.40	4.35	4.30	4.30	0.012	0.013	0.013	0.014	Standard

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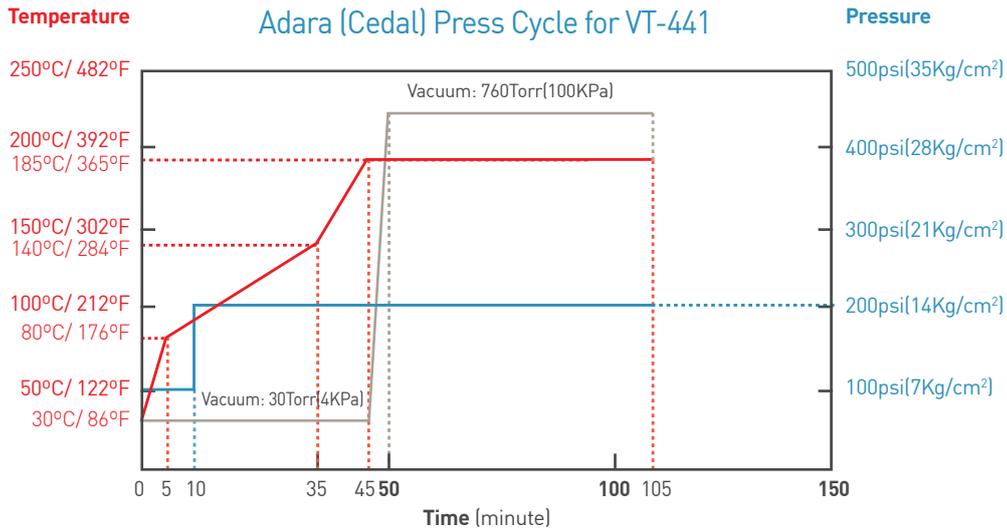
Press Condition

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]
5. Cold Press condition: Keep Plate @ Room Temperature by water; Pressure:100psi; Keep Time: 60minutes



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Typical Drilling Condition (φ0.3-1.0 mm) [Recommended]

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.
5. Entry board	t0.15mm AL	-

Desmearing Process

1. Desmear rate of **VT-441** 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.