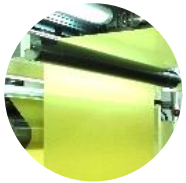
TU-872 Series
Process Guideline

High Speed Low Loss
Advanced Laminate Materials





- Laminates & Prepregs
- Mass Lamination Service
- Insulated Metal Substrate Materials

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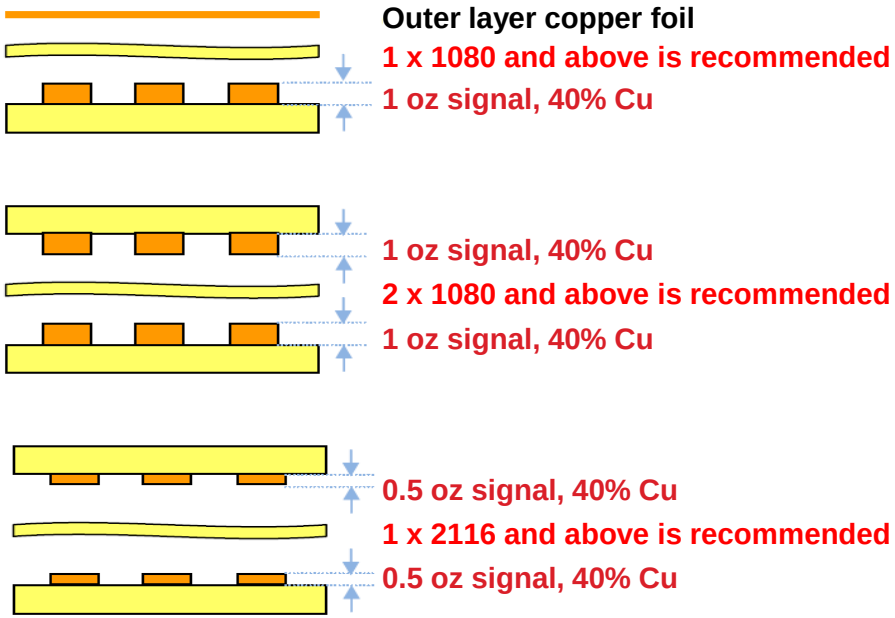
Stack up

Material Selection

Select appropriate prepreg/bonding sheets to ensure good resin encapsulation and meeting the desired thickness requirements. Example:



Lead-free Applications

Depending on the PCB design and lead-free conditions, use of the comparatively lower resin content 7628 and 1506 glass styles should be assessed prudently for encapsulation and bonding suitability.

First Article Inspection

After lamination, a micro-section is recommended for the first article sample to confirm the actual dielectric thickness to determine whether further adjustment is necessary

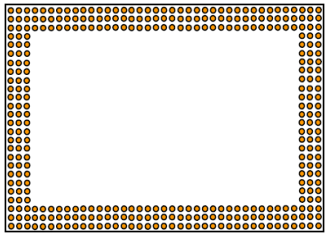
Inner Layer Design

Inner Layer Border Pattern

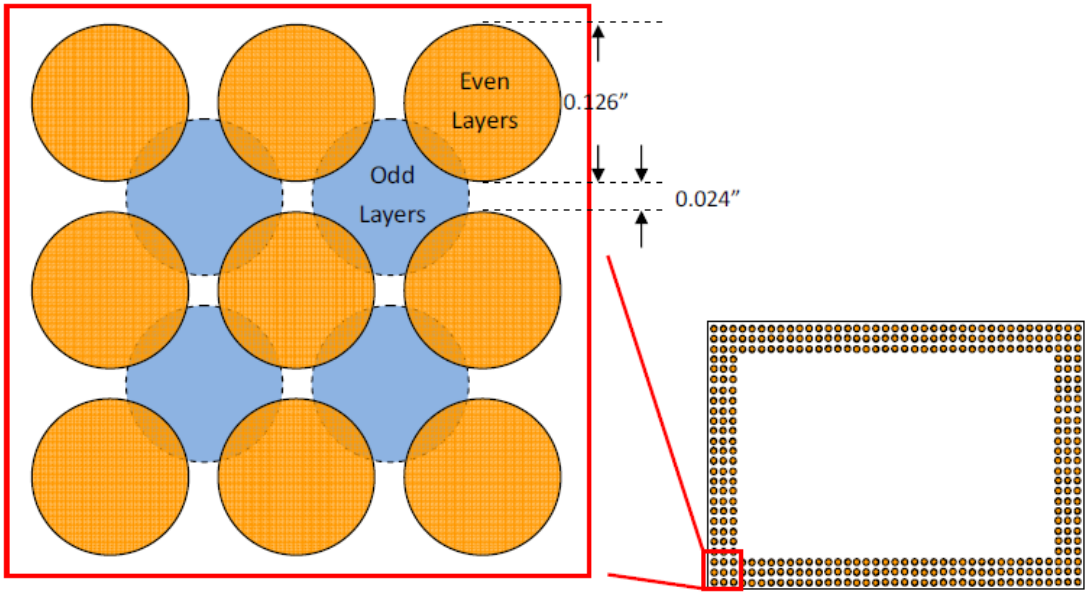
The center and edge thickness of a multi-layer board may vary slightly due to the resin flow characteristic from the dges. Interlocking border pattern with circular or hexagonal pads offers better uniform resin flow and thickness distribution than conventional venting channel pattern for edge thickness control is recommended. The 2 border pattern illustrations are attached for your considerations.

Conventional border venting pattern

Interlocking border venting pattern



Interlocking border venting illustration (top view)



Artwork Compensation

For new artwork designs; the artwork designer should review or initiate the necessary prototype artworks to confirm the actual compensation factors needed before embarking to mass production.

Laminate Surface Treatment

Micro-etch Treatment

When MLS copper foil (or Reversed Treated Foil) is used; the recommendation is to by-pass the micro-etch surface pretreatment process to protect the copper surface roughness that enhances the oxide bond strength.

Oxide Treatment

Brown oxide is preferred & recommended over the other oxide chemistry for the advanced board fabrications; especially for lead-free and high layer count applications.

Post oxide baking at 110 ˚C (material temperature) for 1 hour (minimum) is compulsory to remove the moisture entrapment in the inner layers. For effective inner layers baking; the inner layers should not be stacked together during the bake cycle in the hot air recirculation oven.

Oxide Peel Strength Test

After the PCB shop qualifies the oxide chemistry; the user should perform the oxide peel strength sampling test on the boards to confirm the oxide bond strength performance before and after 6 x 288℃ solder float and IR reflow at lead-free temperature. Typically, the oxide bond strength should not exhibit significant degradation with good oxide chemistry after the thermal excursion process.

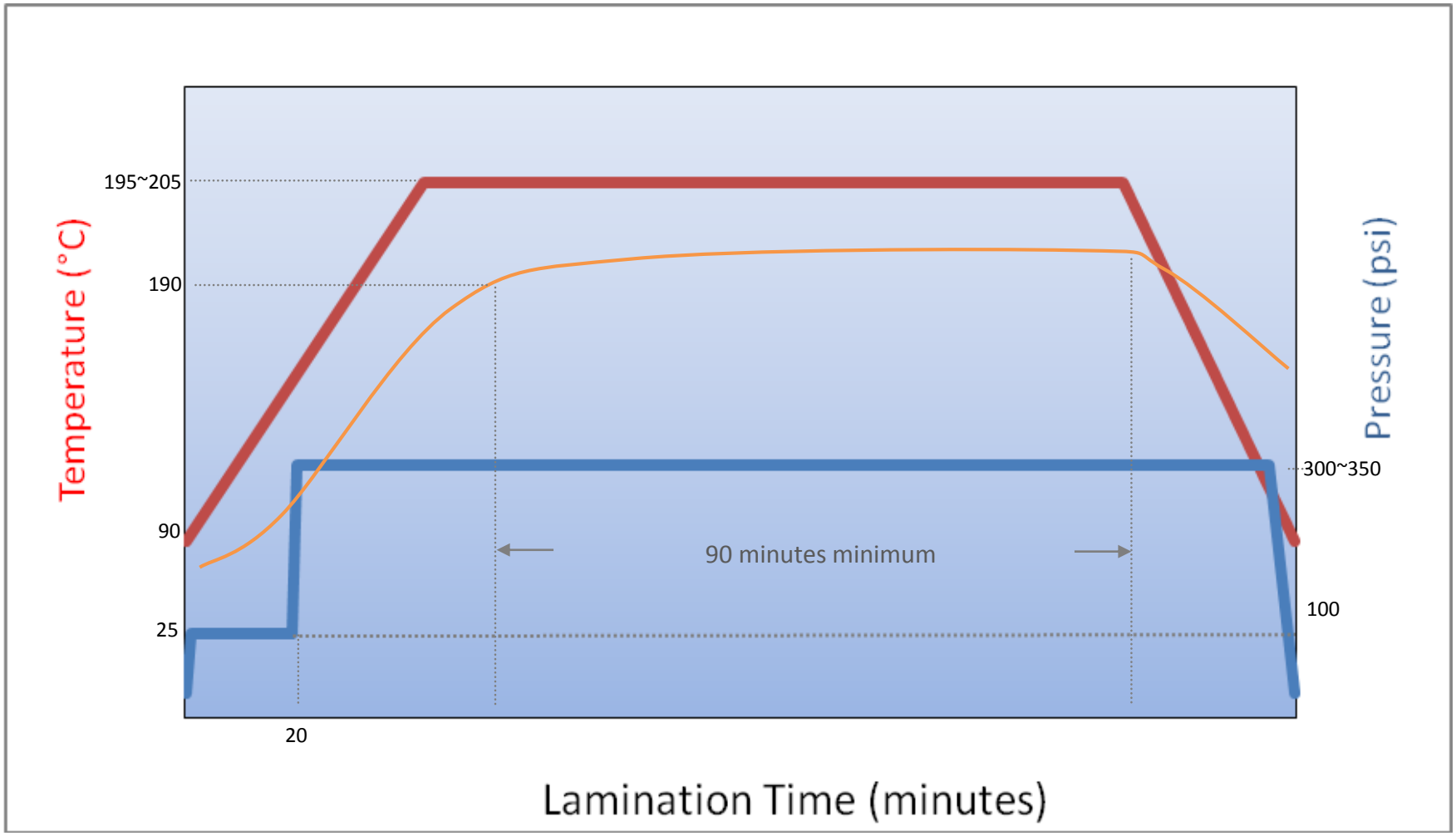
Laminate

Recommended Press Recipe

Press type	Hydraulic vacuum press
Platen Temp.	195~205℃ desired platen temperature
Material Curing Temp.	190℃ (material temperature) for 90 minutes minimum. Extend curing time by 20 minutes for thicker panels (> 100 mils) is recommended
Material rise time	2~4℃/min (from 70℃ to 140℃)
Pressure	Kiss pressure: 100 psi for 20 minutes; Full pressure: 300∽350 psi
Cooling rate	< 3℃/min from 190℃ to 120℃
Vacuum	-28 mm Hg (after closing the press, apply pre-vacuum without pressure for 15 mins prior to start of kiss pressure)

Lamination

Press Profile illustration



Drilling

Drill Size		Feed		Speed	Chip load		Max Hit
(mm)	(in)	IPM	m/min	rpm (K)	mil/rev	um/rev	
0.20	0.0079	30	0.76	110	0.27	6.86	500
0.25	0.0098	40	1.02	110	0.36	9.14	750
0.30	0.0118	70	1.78	100	0.70	17.78	1000
0.35	0.0138	80	2.03	100	0.80	20.32	1200
0.40	0.0157	88	2.24	95	0.93	23.62	1200
0.45	0.0177	96	2.44	88	1.09	27.69	1200
0.50	0.0197	90	2.29	76	1.18	29.97	1500
0.55	0.0217	92	2.34	70	1.31	33.27	1500
0.60	0.0236	90	2.29	70	1.29	32.77	1500
0.65	0.0256	96	2.44	64	1.50	38.10	1500
0.70	0.0276	90	2.29	59	1.53	38.86	1500
0.75	0.0295	82	2.08	54	1.52	38.61	1500
0.80	0.0315	74	1.88	49	1.51	38.35	1500
0.85	0.0335	72	1.83	47	1.53	38.86	1500
0.90	0.0354	68	1.73	45	1.51	38.35	1500
0.95	0.0374	64	1.63	42	1.52	38.61	1500
1.00	0.0394	60	1.52	40	1.50	38.10	1500
1.05	0.0413	57	1.45	38	1.50	38.10	1500
1.10	0.0433	64	1.63	36	1.78	45.21	1500
1.15	0.0453	62	1.57	35	1.77	44.96	1500
1.20	0.0472	58	1.47	32	1.81	45.97	1500
1.25	0.0492	57	1.45	32	1.78	45.21	1500
1.30	0.0512	65	1.65	32	2.03	51.56	1500
1.35	0.0531	60	1.52	29	2.07	52.58	1500
1.40	0.0551	58	1.47	28	2.07	52.58	1500
1.45	0.0571	56	1.42	27	2.07	52.58	1500
1.50	0.0591	55	1.4	27	2.04	51.82	1500
2.00	0.0787	50	1.27	20	2.50	63.50	1500
2.50	0.0984	50	1.27	20	2.50	63.50	1500
3.00	0.1181	60	1.52	20	3.00	76.20	1500
3.50	0.1378	50	1.27	20	2.50	63.50	1500
4.00	0.1575	50	1.27	20	2.50	63.50	1500

-Use pack drill process for board thicknesses are over 2 mm (80mils)
-Use undercut drill bits for critical design

Post Drill Bake

-After the drilling process, bake the boards for 2 hours at 180°C to release the stress and enhancing the copper plating quality

Smears Removal

Plasma Desmear

Plasma desmear process is recommended for the TU-872 with the following suggested parameters.

The plasma process must be carried out in full load. Use dummy boards of similar surface area to make up for any non-full load during the plasma desmear.

Segment Number	Gas Percentages			Operating Pressure	Power Level	Final Temp	Process Time	Pump Down
	CF_4	O_2	N_2					
1	0	90	10	300	4000	80	30	Y
2	10	80	10	300	4500	100	20	N
3	0	100	0	300	4000	80	15	N

Chemical Desmear

Under the high Tg FR4 conditions, the recommended wet chemical desmear chemistry for the TU-872 with Butyl-hydroxide or KMnO4 is strictly restricted to one pass only.

	Temperature	Duration
Butyl-Hydroxide	70~78℃	5~6 min
KMnO4	75~82℃	10~12 min