



HDK TYPE No.	Flame Class	ANSI Grade	Base Laminate	P.W.B. TYPE No.	P.W.B. Copper Conductor (mm)			Solder Limit (C) (sec.)	Temp. Ratio (C)	Min. Thick. (mm)	D.S.R.	P.W.B. Manufacture
					Min. Width	Min. EdgeWidth	Max. Dia.					
V37TT	94V-0	FR-1	MCL-437F	C-2394V-0	0.13	0.38	25.4	260 10	105	0.71	ALL	HOKURIKU ELECTRIC E49161
V47TT	94V-0	FR-1	PLC-2147	C-4394V-0	0.13	0.38	25.4	260 10	105	0.71	ALL	
V87TT	94V-0	FR-1	R-8700,8705	C-3594V-1	0.13	0.38	25.4	260 10	105	0.71	ALL	
N37TT	94V-0	FR-1	MCL-437G	C-6094V-0	0.13	0.35	25.4	260 10	105	1.20	ALL	
N85TT	94V-0	FR-1	R-8500,8505	C-6194V-0	0.13	0.35	25.4	260 10	105	1.20	ALL	
G49TT	94V-0	CEM-3	ELC-4970	C-5494V-0	0.13	0.35	25.4	260 20	130	0.63	ALL	
G68TT	94V-0	CEM-3	E-668	C-5394V-0	0.13	0.35	25.4	260 20	130	0.50	ALL	
G63TT	94V-0	CEM-3	MCL-E-637	C-5294V-0	0.13	0.35	25.4	260 10	105	0.71	ALL	
G17TT	94V-0	CEM-3	R-1781,1786	C-3994V-0	0.13	0.35	25.4	260 10	105	0.71	ALL	
N49TT	94V-0	CEM-3	ELC-4970GS	C-5994V-0	0.13	0.35	25.4	260 20	130	0.80	ALL	

UL Type Designation on P.W.B. requires marking of both Type No. at the time of shipping and Type No. at the time of etching.

### \*Application Note to apply paste through-hole board.

#### 1. What is HOKURIKU paste through-hole.

Unlike conventional copper-plated through-hole board, our process deposits either silver or copper paste (ink) into via hole to electrically connect top and bottom of the board. When designing board circuit, the following consideration must be taken.

① Impedance (through-hole resistance)    ② Current capacity (rated current).    ③ Quality Characteristics (environmental, life etc)

Since through-holes are filled with the paste to form via-hole, component leads are not insertable.

If design conversion is required from your existing plated through-hole board to adopt design of the paste through-hole board, please make sure in advance if in-rush current, pulse current and other transient loads meet our specification, especially on the application circuits of high power, high static capacitance, analog and likes.

#### 2. Base Laminate

Our primary base material of laminate is paper phenolic. It has different characteristics in electrical, heat resistance and so on, compared with glass epoxy laminate. Therefore, please consider those differences well for individual application, not to create any problems.

Paper phenolic board tends to warp as there is significant disparity in etched copper area between top and bottom. So please consider to minimize the disparity and apply equal volume of copper pattern on top and bottom (add dummy pattern if necessary) as much as possible.

Paper phenolic is weaker in mechanical strength than FR-4 or CEM-3 laminates. So, please consider board layout of break-away and/or Chassis-mounting method, not to add excessive stress.

Please note that CEM-3 laminate is also available for our paste through-hole board upon request.

#### 3. Silver Migration.

When using silver material, silver migration is feared to occur and have adverse effects on the circuit. Such silver migration could be even accelerated under the following conditions.

① High voltage application    ② High humidity environment    ③ Narrow spacing between silver paste line / through-hole

By conducting extensive investigation and evaluation, however, we have developed anti-migration materials and processes, and set the safety limit on voltage and spacing on silver line as shown in our rating specification. No incidence of the migration was verified when used within our specification. In case of harsh environmental conditions (dew-condensed, immersed in water, etc.), however, it will be out of our guarantee.

#### 4. Patterning

Unlike photo-imaging method, our process uses screen printing method for copper etching and soldermask.. This method has own limitations in achievable pattern width/spacing. So, please take these limitations into consideration at design stage.

#### 5. Component Placement.

Paste through-hole board has additional thickness by the paste draped around the surface of through-hole area. This could lead to undesirable printing finish of solder paste for SMD components. To prevent this kind of problem, please consider techniques such as laying out SMD components to avoid those thicker areas, applying half-etching on solder screenmask and so on. Due to the different characteristics in heat resistance between paper phenolic and glass-epoxy laminate, the temperature setting/profile of reflow furnace/process should be examined and adjusted to fit into our board.

#### 6. Handling.

No special care is required for the handling of our board. However, scratch on through-hole surface with hard objects should be avoided.

#### 7. Storage.

Storage life is up to 3 months primarily to guarantee effectiveness of preflux (organic surface preservative), where the product is kept unopened in the package under the storage environment of +5~30 C, 70%RH or below, no direct sunlight, no corrosive element like Alkaline, less dust. For higher ambient than 30 C, however, the guarantee is limited up to 2 months.

#### 8. Others.

For more information, please refer to our product standard and/or design rule, which is available upon request.

Please note that we are unable to provide guarantee if our product was used beyond our specification..

This catalogue describes only our product. Please evaluate your application as finished product at your discretion.