



DuPont Printed Circuit Materials

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Printed Circuit Materials

Riston[®] PlateMaster PM200

Preliminary Data Sheet and Processing Information

Photopolymer Films

Plating Resist for Copper, Tin, & Tin/Lead

PRODUCT FEATURES/ APPLICATIONS

- **Negative working, aqueous processable dry film photoresist**
- **Designed for pattern plate applications on scrubbed and unscrubbed electroless copper, and Direct Plate surfaces.**
- **Especially designed for pattern plate applications on smooth copper surfaces e.g., some direct plate, jet alumina, marginal surface preparation.**
- **Fine Line capability with wider exposure latitude, and reduced sensitivity to off-contact.**
- **Strong resistance to lifting in copper, tin, and tin/lead plating baths.**
- **Wide processing latitude.**
- **Available in 40 micron (1.5 mil), 50 micron (2.0) and 75 micron (3.0 mil) thicknesses.**

PROCESSING DATA

This Data Sheet documents specific process information for Riston® PlateMaster PM200. Data quoted in this guide have been generated using production equipment as well as laboratory test methods, and are offered as a guideline. Actual production parameters will depend upon the equipment, chemistries, and process controls in use, and should be selected for best performance. For more background on general Riston® processing see the General Processing Guide(DS98-41).

STORAGE & SAFE LIGHTING

See recommendations in the General Processing Guide (DS98-41).

SAFE HANDLING

Consult the Material Safety Data Sheet (MSDS) for Riston® dry film photoresist vapors. The vapor MSDS for this film was prepared using the highest lamination roll temperature recommended for use. If you choose to exceed this temperature, be aware that the amount of vapor may increase and that the identity of the materials vaporized may vary from those in the MSDS. For more Safe Handling information, see publication TB-9944 "Handling Procedure for DuPont Photopolymer Films".

WASTE DISPOSAL

For questions concerning disposal of photoresist waste refer to the latest DuPont literature and Federal, State, and Local Regulations.

PART 1: COPPER SURFACES AND SURFACE PREPARATION

PlateMaster PM200 has very strong resistance to lifting on all surfaces. Riston® PlateMaster PM200 is compatible with the following surfaces and surface preparations:

- Electroless:
 - Unscrubbed
 - Pumice and Brush scrubbed
- Direct metallization surfaces:
 - BlackHole
(should be compatible with other direct metallization surfaces)
- Panel plated copper (including conveyORIZED plating such as Uniplate® or "Segmenta")
 - Unscrubbed
 - Scrubbed

Antitarnish

The following antitarnishes have been used successfully per manufacturers' processing recommendations:

- Enthone Entek Cu56
(Others may give equally acceptable results)

For prelamination cleaning suggestions, see General Processing Guide and its references.

PART 2: LAMINATION

Riston® PlateMaster PM200 was formulated for excellent conformation in hot roll lamination.

Lamination Conditions DuPont HRL-24 & HRL-24 Film Laminator

- Pre-Heat: Optional
- Lam. Roll Temp: 100-120°C (215-245°F)
- Roll Speed: 0.6-1.5 m/min (2-5 ft/min)
- Air Assist Pressure: 0-2.8 bar (0-40 psig)

Note: for •1.4 bar use heavy-duty rolls

Laminator Conditions for Automatic Sheet Laminators

- Preheat: Optional
 - Seal Bar Temp.: 50 - 80°C
 - Lam. Roll Temp: 100-115°C
 - Seal Bar Pressure: 3.5-4.5 bar (50-65 psig)
 - Lam. Roll Pressure: 3.0-5.0 bar (43-72 psig)
 - Seal Time: 1-4 seconds
 - Lamination Speed: 1.5-3 m/min
-

Note: For Hakuto type laminators, a lamination roll temperature range of 105-120°C is recommended.

Expected Board Exit Temperature:

Innerlayers: 60-70°C (140-160°F)

Outerlayers (Cu/Sn or Cu/Sn-Pb): 45-55°C (110-130°F)

Outerlayers(gold plate): 50-55°C (120-130°F)

(For information on how to use Board Exit Temperature for process control, see General Processing Guide)

General Suggestions

- Start with Roll temperatures of 110 to 115°C and adjust as necessary.
- Reduced lamination roll pressure and/or temperature may be required in tenting applications

to avoid tent breakage and resist flow into through-holes.

- Ensure that panel holes are completely dry before resist lamination.
- Resist wrinkling can be caused by high temperatures. Decrease roll temperature or eliminate preheat.
- Panels may be exposed immediately after lamination; however, allow enough time for panels to cool to room temperature before exposure.
- Note comments under Safe Handling with respect to exceeding highest recommended lamination roll temperature.

PART 3: EXPOSURE

Riston® PlateMaster PM200 can be exposed on all standard equipment used in the printed circuit board industry. Choose lamps that compliment the peak resist response of 350 to 380 nm.

Riston® PlateMaster PM200 has better resolution and wider exposure latitude than other resists. It is also more resistant to off-contact exposure defects, which are common in glass/glass exposure frames.

Resolution down to 50 microns (2 mil) lines and spaces is possible with Riston® PlateMaster PM200 in optimized production environments.

RECOMMENDED EXPOSURE RANGE

	PM240	PM250
RST	10-20	10-20
SST	7-10	7-10
mJ/cm ²	35-100	40-110

Suggestions:

- Start with RST 13-14 for fine line applications, (100 microns L/S).
- Start with RST 15-16 for ≥ 125 microns L/S.

Note:

- RST = DuPont Riston® 25-Step Density Tablet (read as highest resist step)
- SST = Stouffer 21-Step Sensitivity Guide (read as highest resist step)
- Exposure energy (mJ/cm²) from International Light Radiometer model IL1400A with Super Slim UV Probe (SSL001A) on an Olec AP30-8000 exposure unit.

PART 4: DEVELOPMENT

Riston® PlateMaster PM200 can be developed in sodium or potassium carbonate with good productivity. It has wide development latitude and is less sensitive to developer concentration, breakpoint, and rinse water hardness than most other resists.

Development Recommendation

- **Spray Pressure:** 1.4-2.4 bar (20-35 psig) (high impact direct-fan or cone nozzle preferred).
- **Chemistry:**
 - Na₂CO₃: 0.7-1.0 wt%; 0.85 wt% preferred
 - Na₂CO₃·H₂O: 0.8-1.1 wt%; 1.0 wt% preferred
 - K₂CO₃: 0.8-1.1 wt%; 1.0 wt% preferred
- **Temperature:** 27-35°C (80-95°F); 30°C(85°F) preferred
- **Breakpoint:** 50-70 % (60 % preferred)
- **Dwell Times** (approximate)
 - Riston® PlateMaster PM240: 28-40 secs
 - Riston® PlateMaster PM250: 38-50 secs
- **Resist Loading:**
 - Feed & Bleed: 4-8 mil-ft²/gal; 0.07-0.14 m² liter for 38 micron film thickness (PM240)
 - Batch Processing: to 12 mil-ft²/gal; to 0.20 m²/liter for 50 micron film thickness (PM250)
- **Rinse water:** hard water (150-250 ppm CaCO₃ equivalent), or soft water are acceptable.
- **Rinse Spray Nozzles:** High Impact, direct fan nozzles preferred
- **Drying:** blow dry thoroughly; Hot air preferred
- **Feed & Bleed Control:** Set pH controller to a set point of 10.6 for best results, or

maintain active carbonate at 65-78% of total carbonate, or use board count to maintain the recommended resist loading.

- **Batch Processing Control:** Dump when reaching pH 10.2, or when active carbonate has fallen to 60% of total carbonate.

Defoamers

Riston® PlateMaster PM200 could require the use of a defoamer. If required, add 0.8 ml/liter (3 ml/gallon) of these antifoams:

- FoamFREE™ 940
 - Pluronic 31R1
- Others may work as well.

PART 5: PLATING (ACID COPPER SULFATE; TIN/LEAD; TIN)

(Follow plating vendors' recommendations)

Riston® PlateMaster PM200 can be used for pattern plate processes with acid copper, tin/lead, tin, nickel and gold plating baths. Riston® PlateMaster PM200 has very strong resistance to lifting and underplating.

Recommendations: Preplate Cleaning Process Sequence

- Acid Cleaner : 38-50°C (100-120°F); 2-4 minutes
- Spray and/or Tank Rinse: 2 minutes
- Microetch to remove 0.15-0.25 µm (5-10 µ") copper (time: as required)
- Spray and/or Tank Rinse: 2 minutes
- Sulfuric acid (5-10 vol%) dip; 1-2 minutes
- (Optional: spray rinse; 1-2 minutes)

Recommended Acid Hot Soak Cleaners:

VersaCLEAN® 425:
6-12 vol%; 40-50°C (100-120°F) 2-4 minutes

Note: Other cleaners may perform equally well.

PART 6: ETCHING

- Riston® PlateMaster PM200 is compatible with most acid etchants, e.g., cupric chloride (free HCl normality ≤ 3.0 N), hydrogen peroxide/sulfuric, and ferric chloride.
- Riston® PlateMaster PM200 is not resistant to most alkaline ammonical etch processes.

PART 7: STRIPPING

Riston® PlateMaster PM200 film is formulated to dissolve slowly in stripping solution after breaking up into pieces. This can greatly increase the life of stripping solution and reduce costs, if the resist can be removed before dissolving.

Stripping Recommendations

- **Chemistry:**
 - NaOH: 1.5 - 3.0wt%; faster stripping at 3wt%
 - KOH: 1.5 - 3.0wt%; faster stripping at 3wt%
 - Proprietary Strippers: concentration per vendor recommendation
- **Spray Pressures:** 1.4-2.4 bar (20-35 psig)
- **Spray Nozzles:** High Impact direct fan
- **Breakpoint:** 50% or lower
- **Stripper Dwell Times** (seconds) at 55°C (130°F) (approximate). Dwell time is total time spent in the stripper, given a 50% breakpoint.

<u>Chemistry</u>	<u>PM240</u>	<u>PM250</u>
3.0 wt% NaOH	60-80	90-120
1.5wt% NaOH	130-160	150-180
3.0wt% KOH	110-140	130-170
1.5 wt% KOH	140-170	150-180

- **Defoamers:** Follow recommendations in Developer Section.

Proprietary Strippers

Proprietary stripper formulations under evaluation.



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