



**DuPont Photopolymer & Electronic Materials**

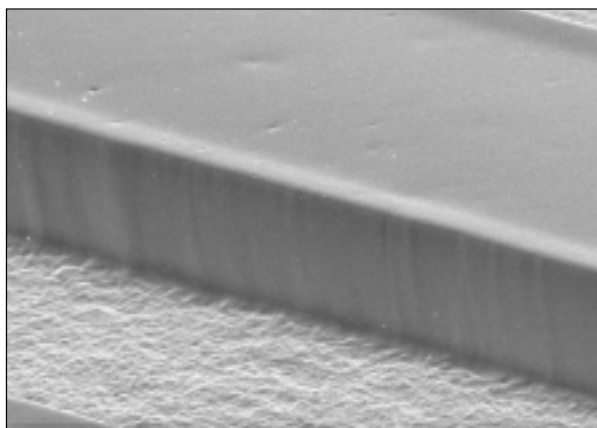
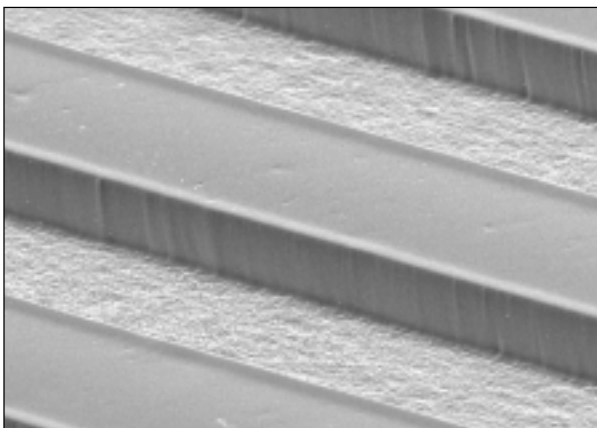
Printed Circuit Materials

# **Riston® GPM200**

## **Data Sheet & Processing Information**

**Photopolymer Films**

**Photopolymer Dry Film for Acid and Alkaline Etch, Copper, Tin, & Tin/Lead, Nickel & Gold**



## PRODUCT FEATURES/ APPLICATIONS

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Riston® GPM200 has very strong resistance to lifting on all surfaces. It has been formulated to be compatible with incoming copper clad surfaces, scrubbed and unscrubbed electroless, direct metalization processes and panel plated copper.

The resist is designed to be used in the following applications: acid and alkaline etch, tent and etch, copper, tin, tin/lead, nickel and gold plating.

## STORAGE

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

## PROCESSING DATA

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This Processing guide documents specific process information for Riston® GPM200. 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 processing see the General Processing Guide.

## SAFE HANDLING

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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 H-43328 (12/92) "Handling Procedure for DuPont Photopolymer Films".

## WASTE DISPOSAL

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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

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Riston® GPM200 has very strong resistance to lifting on all surfaces. Riston® GPM200 is compatible with the following surfaces and surface preparations:

- I/L copper
  - Pumice
  - Chemical Clean
- Electroless:
  - Unscrubbed
  - Pumice and Brush scrubbed
- Direct metallization surfaces
- Panel plated copper
  - Unscrubbed
  - Scrubbed

### Antitarnish

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

- Shipley 7130
  - Duratech PCL
  - Enthone Entek Cu56
- (Others may give equally acceptable results)

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

## PART 2: LAMINATION

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### Lamination Conditions for DuPont HRL-24/Yieldmaster® Film Laminator

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|--------------------|-----------------------|
| • Pre-Heat:        | Optional              |
| • Lam. Roll Temp.: | 110-120°C (230-245°F) |
| • Recommended :    | 115°C (239°F)         |
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**NOTE:** Expected Board Exit Temperature:

Innerlayers: 60-70°C (140-160°F)  
Outerlayers (gold plate): 50-55°C (120-130°F)  
Outerlayers (Cu/Sn or Cu/Sn-Pb): 45-55°C (110-130°F)

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

- Roll Speed: 0.6-1.5 m/min (2-5 ft/min)
- Air Assist Pressure: 0-2.8 bar (0-40 psig)  
Note: for  $\geq 1.4$  bar use heavy-duty rolls)

### Lamination Conditions for Automatic Sheet Laminators

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|--------------------------|-----------|
| • Pre-heat:              | Optional  |
| • Seal Bar Temp.:        | 50-80°C   |
| • Lamination Roll Temp.: | 110-120°C |
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**NOTE:** Expected Board Exit Temperature:

Innerlayers: 60-70°C (140-160°F)  
Outerlayers (gold plate): 50-55°C (120-130°F)  
Outerlayers (Cu/Sn or Cu/Sn-Pb): 45-55°C (110-130°F)

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

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- 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 (5-10 ft/min)

## PART 3: EXPOSURE

Riston® GPM200 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® GPM200 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® GPM200 in optimized production environments.

### Recommended Exposure Range

	GPM213	GPM215	GPM220
Nominal Thickness	30µm	40µm	50µm
RST25	10-18	10-18	10-18
SST21	7-9	7-9	7-9
SST41	19-28	19-28	19-28
mJ/cm <sup>2</sup>	20-55	25-60	30-75

### 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 41 = Stouffer 41-Step Sensitivity Guide (read as highest resist step)
- SST = Stouffer 21-Step Sensitivity Guide (read as highest resist step)
- Exposure energy (mJ/cm<sup>2</sup>) from International Light Radiometer model IL1400A with Super Slim UV Probe (SSL001A) on an Olec AP30-8000 exposure unit.

## PART 4: DEVELOPMENT

Riston® GPM200 can be developed in sodium or potassium carbonate with good productivity. It has wide development latitude.

### Development Recommendations

- **Spray Pressure** 1.4-2.2 bar (25-30 psig)  
High impact direct-fan or cone nozzles preferred
- **Chemistry**  
Na<sub>2</sub>CO<sub>3</sub> 0.7-1.0 wt%; 0.85 wt% preferred  
Na<sub>2</sub>CO<sub>3</sub>·H<sub>2</sub>O 0.8-1.1 wt%; 1.0 wt% preferred  
K<sub>2</sub>CO<sub>3</sub> 0.8-1.1 wt%; 1.0 wt% preferred
- **Temperature** 27-35°C (80-95°F); 30°C (85°F) preferred
- **Breakpoint** 50-65% (60% preferred)
- **Dwell Times (approx.)**  
Riston® GPM220 32-42 secs  
Riston® GPM215 25 - 35 sec  
Riston® GPM213 22-30 secs
- **Resist Loading:**  
Feed & Bleed 4-8 mil-ft<sup>2</sup>/gal: 0.07-0.14 m<sup>2</sup>/liter  
Batch To 12 mil-ft<sup>2</sup>/gal; to 0.20 m<sup>2</sup>/liter
- **Rinse Water** Hard water (150-250 ppm CaCO<sub>3</sub> equivalent), or soft water are acceptable
- **Rinse Spray Nozzles** High Impact, direct fan nozzles preferred
- **Drying** Blow dry thoroughly; Hot air preferred

**NOTE:**

Dwell Time ranges were established in Chemcut 547 type developer equipment, using sodium carbonate and 2-10 mil-ft<sup>2</sup>/gal (0.07-0.17 m<sup>2</sup>/liter) loading, with all other variables set within the preferred ranges mentioned above.

**Defoamers**

Riston® GPM200 could require the use of a defoamer. If required, add 0.8 ml/liter (3 ml/gallon) of one of these antifoams:

FoamFREE™ 940

Pluronic 31R1

Dexter DF1205

RBP BB

Others may work equally well.

**PART 5: PLATING**

(acid copper sulfate; tin/lead; tin; nickel; gold)

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(Follow plating vendors' recommendations )

Riston® GPM200 can be used for pattern plate processes with acid copper, tin/lead, tin, nickel and gold plating baths. Riston® GPM200 has very strong resistance to lifting and underplating. The plating process conditions should not be altered for the GPM200 test probe.

**Recommendations: Preplate Cleaning Process Sequence**

- Acid Cleaner : 38-50°C (100-120°F); 2-4 minutes
- Spray Rinse: 2 minutes
- Microetch to remove 0.15-0.25 µm (5-10µ") copper (time: as required)
- Spray 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 min

Others may work equally well

**PART 6: ETCHING**

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- Riston® GPM200 is compatible and strongly resistant to most alkaline ammonical etch processes. Excellent adhesion after multiple passes through alkaline machines capable of 4oz copper.
- Riston® GPM200 is compatible with most acid etchants, e.g. cupric chloride ( free HCl normality ≤ 3.0 N), H<sub>2</sub>O<sub>2</sub>/H<sub>2</sub>SO<sub>4</sub>, and ferric chloride.

**PART 7: STRIPPING**

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Riston® GPM200 is formulated to dissolve slowly in stripping solution after breaking up into pieces. This can greatly increase the life of the stripping solution and reduce costs, if the resist can be removed before dissolving. Filtration is strongly recommended.

**Stripping Recommendations****• Chemistry:**

NaOH: 1.5-3 wt%; faster stripping at 3 wt%

KOH: 1.5-3 wt%; faster stripping at 3 wt%

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). Dwell time is the total time spent in the stripper, given a 50% breakpoint:

<u>Chemistry</u>	<u>GPM215</u>	<u>GPM220</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 Development Section.

#### **Proprietary Strippers:**

The following proprietary strippers have been used successfully for GPM200.

- RBP ADF-30
- Dexter 2210
- Dexter RS1609
- NTS402HV

Others may perform equally well.

Generic mixtures of 3% NaOH (or KOH) plus 3% MEA (monoethanolamine) have also been used successfully.



**DuPont Photopolymer & Electronic Materials**

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