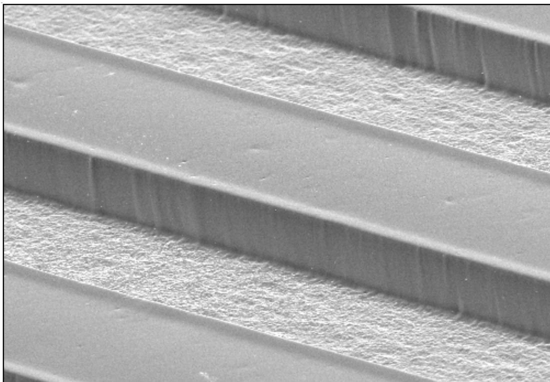
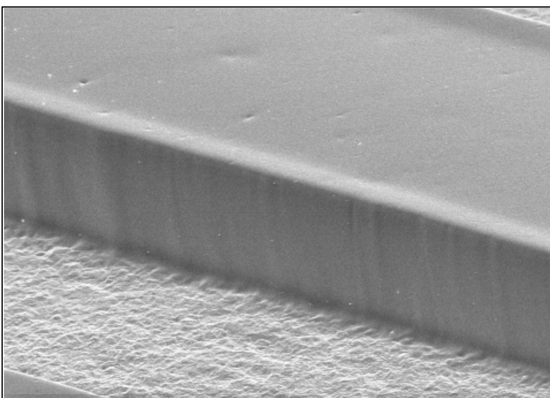
# DuPont™ Riston®
# MultiMaster MM100i Series
## DATA SHEET & PROCESSING INFORMATION

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





## Product Features/ Applications

Riston® MultiMaster MM100i 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.

## Processing Data

This Processing guide documents specific process information for Riston® MultiMaster MM100i. 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.

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## PART 1: Copper Surfaces and Surface Preparation

Riston® MultiMaster MM100i has very strong resistance to lifting on all surfaces. Riston® MultiMaster MM100i 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:

- 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

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

- Pre-Heat: Optional
- Lam. Roll Temp.: 105-120°C (223-245°F)
- Recommended : 115°C (239°F)

***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 ≥1.4 bar use heavy-duty rolls)

### Lamination Conditions for Automatic Sheet Laminators

- Pre-heat: Optional
- Seal Bar Temp.: 50-80°C
- Lamination Roll Temp.: 100-115°C

***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)

- 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® MultiMaster MM100i 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® MultiMaster MM100i 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® MultiMaster MM100i in optimized production environments.

**Recommended Exposure Range**

| | MM115 | MM120 |
|---|---|---|
| Nominal Thickness | 50µm | 75µm |
| RST 25 | 10-18 | 10-18 |
| SST 21 | 7-9 | 7-9 |
| SST 41 | 19-28 | 19-28 |
| $mJ/cm^2$ | 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$^2$) from International Light Radiometer model IL1400A with Super Slim UV Probe (SSL001A) on an Olec AP30-8000 exposure unit.

## PART 4: Development

Riston® MultiMaster MM100i 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**

| | |
|---|---|
| $Na_2CO_3$ | 0.7-1.0 wt%; 0.85 wt% preferred |
| $Na_2CO_3.H_2O$ | 0.8-1.1 wt%; 1.0 wt% preferred |
| $K_2CO_3$ | 0.75 -1.0 wt%; 0.9 wt% preferred |

***Note***: The use of buffered development solutions, containing KOH (Potassium Hydroxide) or NaOH (Sodium Hydroxide), is not recommended with DuPont Riston® Photoresists. These solutions can lead to excessive foaming and high dissolved photoresist loading, compromising sidewall quality and photoresist resolution. Also, use of buffered chemistries can increase residue build-up in the developer, resulting in increased weekly equipment clean-out costs.

- **Temperature**

  27-35°C (80-95°F); 30°C (85F) preferred

- **Breakpoint**

  50-65% (60% preferred)

- **Dwell Times (approx.)**

  Riston® MultiMaster120 32-42 secs
  Riston® MultiMaster115 25 - 35 sec

- **Resist Loading:**

  Feed & Bleed
  4-8 mil-ft2/gal: 0.07-0.14 m2/liter
  Batch To 12 mil-ft2/gal; to 0.20 m2/liter

- **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 throughly; Hot air preferred

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

### Defoamers

Riston® MultiMaster MM100i could require the use of a defoamer. If required, add 0.8 ml/liter (3 ml/gallon) of one of these antifoams:

Pluronic 31R1; Dexter DF1205; RBP BB
Others may work equally well.

## PART 5: Plating
## (acid copper sulfate; tin/lead; tin; nickel; gold)

(Follow plating vendors' recommendations )
Riston® MultiMaster MM100i can be used for pattern plate processes with acid copper, tin/lead, tin, nickel and gold plating baths. Riston® MultiMaster MM100i has very strong resistance to lifting and underplating. The plating process conditions should not be altered for the MultiMaster MM100i 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)

## PART 6: Etching

- Riston® MultiMaster MM100i is compatible and strongly resistant to most alkaline ammonical etch processes. Excellent adhesion after multiple passes through alkaline machines capable of 4oz copper.

- Riston® MultiMaster MM100i is compatible with most acid etchants, e.g. cupric chloride ( free HCl normality$\leq$3.0 N), $H_2O_2/H_2SO_4$, and ferric chloride.

## PART 7: Stripping

Riston® MultiMaster MM100i is formulated to dissolve slowly in stripping solution afer 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:

| Chemistry | MM115 | MM120 |
|---|---|---|
| 3.0 wt% NaOH | 60-80 | 90-120 |
| 1.5 wt% NaOH | 130-160 | 150-180 |
| 3.0 wt% 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 MultiMaster MM100i.

- RBP ADF-30
- Durastrip ARS-40
- Atotech RR-3
- Dexter RS1609
- NTS402HV
- Alphametals PC 489

Others may perform equally well.
Generic mixtures of 3% NaOH (or KOH) plus 3% MEA (monoethanolamine) have also been used successfully.

## Storage
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 Technical Bulletin 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.

For further information, please contact your local representative.

DuPont Electronic Technologies
14 T. W. Alexander Drive
Research Triangle Park, NC 27709 USA

www.imaging-materials.dupont.com

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