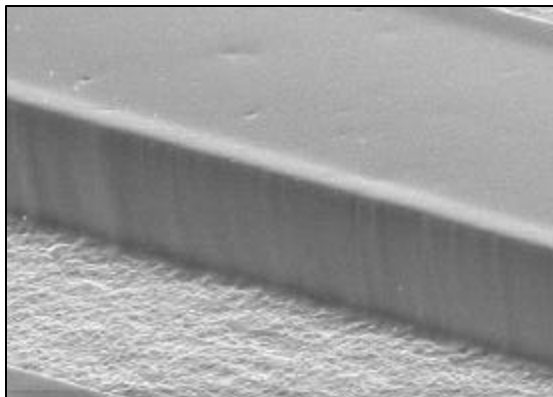
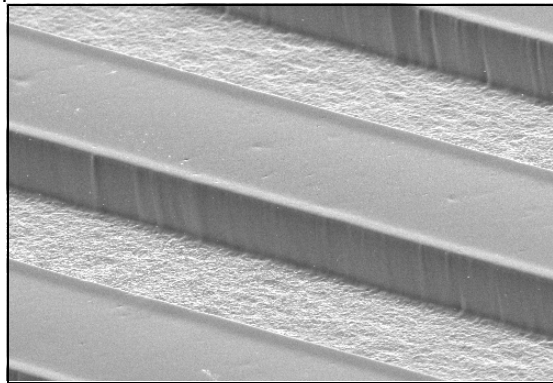


DuPont™ Riston® MultiMaster MM500 Series

Data Sheet & Processing Information

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



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PRODUCT FEATURES/ APPLICATIONS

Riston® MultiMaster MM500 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 MM500. 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.

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.

PART 1: COPPER SURFACES AND SURFACE PREPARATION

Riston® MultiMaster MM500 has very strong resistance to lifting on all surfaces. Riston® MultiMaster MM500 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 MM500 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 MM500 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 MM500 in optimized production environments.

Recommended Exposure Range

	<u>MM530</u>	<u>MM540</u>	<u>MM550</u>
Nominal Thickness	30µm	38 µm	50 µm
RST 25	10 - 18	10 -18	10 - 18
SST 21	7 - 9	7 - 9	7 - 9
SST 41	19 - 28	19 - 28	19 - 28
mJ/cm²	23 - 50	25 - 55	28 - 60

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/cm²) from International Light Radiometer model IL1400A with Super Slim UV Probe (SSL001A) on an Olec AP30-8000 exposure unit.

PART 4: DEVELOPMENT

Riston® MultiMaster MM500 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

$\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$ 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 (85°F) preferred

Breakpoint

50-65% (60% preferred)

Dwell Times (approx.)

Riston® MultiMaster 530 39 - 56 sec.

Riston® MultiMaster 540 45 - 65 sec.

Riston® MultiMaster 550 52 - 72 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 thoroughly; Hot air preferred

NOTE: Dwell Time ranges were established in Chemcut 547 type developer equipment, using sodium carbonate and 2-10 mil-ft²/gal (0.07-0.17 m²/liter) loading, with all other variables set within the preferred ranges mentioned above.

Defoamers

Riston® MultiMaster MM500 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)

(Follow plating vendors' recommendations)

Riston® MultiMaster MM500 can be used for pattern plate processes with acid copper, tin/lead, tin, nickel and gold plating baths. Riston® MultiMaster MM500 has very strong resistance to lifting and underplating. The plating process conditions should not be altered for the MultiMaster MM500 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

- Riston® MultiMaster MM500 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 MM500 is compatible with most acid etchants, e.g. cupric chloride (free HCl normality ≤ 3.0 N), H_2O_2/H_2SO_4 , and ferric chloride.

PART 7: STRIPPING

Riston® MultiMaster MM500 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:

Chemistry	MM500
3.0 wt% NaOH	60-80
1.5 wt% NaOH	130-160
3.0 wt% KOH	110-140
1.5 wt% KOH	140-170

Defoamers:

Follow recommendations in Development Section.

Proprietary Strippers:

The following proprietary strippers have been used successfully for MultiMaster MM500.

- 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.

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Caution: Do not use in medical applications involving permanent implantation in the human body. For other medical applications, see "DuPont Medical Caution Statement", H-51459.



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