PRODUCT FEATURES/ APPLICATIONS

- Negative working, aqueous processable dry film photoresist with very high photospeed.
- Especially developed for exposure using UV laser direct imaging.
- Available in 30 micron (1.2 mil), and 50 micron (2.0 mil) thicknesses.
- Suitable for print and etch application with acid or alkaline etching.
- Suitable for pattern plate applications on scrubbed and unscrubbed electroless copper and most direct plate surfaces.
- Suitable for most photochemical machining (chemical milling) applications.
- Suitable for tent-and-etch applications.

PROCESSING DATA

This Data Sheet documents specific process information for Riston® LDI300. 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® LDI300 processing see the General Processing Guide (DS98-41).
PART 1: COPPER SURFACES AND SURFACE PREPARATION
Riston® LDI300 has very strong resistance to lifting on all surfaces. Riston® LDI300 is designed to be compatible with the following surfaces and surface preparations:
• Vendor copper (standard foil, fine grain foils, reverse treated foils)
• Electroless copper:
  Unscrubbed
  Pumice and brush scrubbed
• Direct metallization surfaces:
• Panel plated copper (including conveyerized plating such as Uniplate® or "Segmenta")
• Double Treat Copper

Antitarnishes:
The following antitarnishes have been used successfully per manufacturers’ processing recommendations: Data not yet available. For prelamination cleaning, see the General Processing Guide and its references.

PART 2: LAMINATION
Riston® LDI300 has been formulated for excellent conformation in hot roll lamination

Expected Board Exit Temperature:
Innerlayers: 60-70°C (140-160°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 the 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 aggravated by high temperature or panel preheating. 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® LDI300 has been specially formulated for exposure using UV laser direct imaging equipment. The peak resist response is in the range of 350 to 380 nm.
Riston® LDI300 has been optimized to give exceptional line edge quality and resolution in laser direct imaging. Not only does it allow for faster throughput, but also better image quality than most of the slower photospeed standard resists.

Resolution below 50 μm (2 mil) lines and spaces is possible with Riston® LDI300 in optimized production environments.

### Recommended Exposure Range

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<th>LDI330</th>
<th>LDI350</th>
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<tbody>
<tr>
<td>mJ/cm²</td>
<td>8-10</td>
<td>10-12</td>
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### Suggestions:
- Actual energy required may vary from one imager to another.
- Set up the process mid point where the resist gives 1:1 line width reproduction of CAD data after development. The working range is midpoint - 30% to midpoint +50% energy.

**Note:** Approximate exposure energy (mJ/cm²) is calculated from laser power, polygon speed and transmission efficiency of the laser printer. On contact printers, the energy can be accurately measured with International Light Radiometer Model ZL400A with Super Slim UV Probe.

Riston® LDI300 can also be exposed on some standard equipment used in the printed circuit board industry. Due to the high photospeed, performance in high power exposure units (5-8 kW) could be limited depending on the accuracy of the shutter mechanism or lamp on/off switch.

### PART 4: DEVELOPMENT

Riston® LDI300 can be developed in sodium or potassium carbonate with good productivity. It has wide development latitude with respect to developer concentration, breakpoint, and rinse water hardness.

#### 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: 0.75-1.0 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:** 50-70 % (60 % preferred)
- **Dwell Times (approximate)**
  - Riston® LDI330 (30μm): 29-41 sec.
  - Riston® LDI350 (50μm): 35-49 sec.
- **Resist Loading:**
  - Feed & Bleed: <12 mil-ft²/gal;
  - <0.17 m²/liter
  - Batch Processing: to 16 mil-ft²/gal; to 0.4 m²/liter for 40μm film thickness
- **Rinse Water:** hard water (150-250 ppm CaCO₃ equivalent preferred), 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.
PART 6: ETCHING

• Riston® LDI300 is highly resistant to most alkaline etch processes.
• Riston® LDI300 is compatible with most acid etchants, e.g., cupric chloride (free HCl normality < 3.0 N), H₂O₂/H₂SO₄ and ferric chloride.

PART 7: STRIPPING

Riston® LDI300 is formulated for easy stripping between plated lines. It is recommended to use continuous removal of resist skins, e.g., with a sloped screen or drum filter and conveyor, to avoid spray nozzle and filter plugging.

Stripping Recommendations

• Chemistry:
  - NaOH: 1.5 - 3.0 wt%: faster stripping at 3 wt%
  - KOH: 1.5 - 3.0 wt%: faster stripping at 3 wt%
  - Proprietary Strippers: concentration per vendor
• Spray Pressures: 1.5-2.5 bar (26-44 psig)
• Spray Nozzles: High Impact direct fan
• Breakpoint: 50% or lower
• Stripper Dwell Times: (seconds) at 55°C (130°F)
  Dwell time is total time spent in the stripper, given a 50% breakpoint.

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<tr>
<th>Chemistry</th>
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<tr>
<td>3.0 wt% NaOH</td>
<td>50-80</td>
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<tr>
<td>1.5 wt% NaOH</td>
<td>100-120</td>
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• Defoamers: Follow recommendations in Developer Section.
**STORAGE & SAFE LIGHTING**

**SAFE HANDLING**
Consult the Material Safety Data Sheet (MSDS) for Riston® LDI300 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 on DuPont™ LaserSeries, please contact your local representative.

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

www.imaging-materials.dupont.com