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## LAMINAR<sup>®</sup> UDF7200M DRY FILM PHOTORESIST

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### DESCRIPTION

LAMINAR<sup>®</sup> UDF7200M DRY FILM PHOTORESIST is a negative working aqueous resist specifically designed for UV laser direct imaging (365nm and 405nm) applications. LAMINAR<sup>®</sup> UDF7200M has been formulated for acid and alkaline etching applications and plating applications in Copper, Tin, Tin/Lead Nickel and Gold in the production for *high density circuit boards*.

### SPECIFICATION

Film Type	UDF7215M	UDF7220M	UDF7225M	UDF7230M
Thickness( $\mu$ m)	15 $\pm$ 2	20 $\pm$ 2	25 $\pm$ 2	30 $\pm$ 2
Color(unexposed)	Green	Green	Green	Green
(exposed)	Blue	Blue	Blue	Blue
Recommended uses	Print-and-Etch Tent-and-Etch	Print-and-Etch Tent-and-Etch	Print-and-Etch Tent-and-Etch	Print-and-Etch Tent-and-Etch

### FEATURES

- ✚ Good adhesion to the substrate.
- ✚ Fast photo-speed.
- ✚ High resolution capability.
- ✚ Straight sidewalls.
- ✚ Clean developing characteristics.
- ✚ High chemical resistance to acidic etchants.

### PROCESSING

#### *SURFACE PREPARATION*

For maximum dry film adhesion, surfaces to be coated must be clean, dry, and free of contaminates prior to lamination. Several cleaning methods work acceptably for the LAMINAR<sup>®</sup> UDF7200M DRY FILM PHOTORESIST such as jet pumice scrubbers, Scotch Brite, aluminum oxide spray, pumice brushing, and chemical cleaning.

## **LAMINATION**

**LAMINAR ® UDF7200M DRY FILM PHOTORESIST** can be applied with all types of commercially available laminators. The automatic cut sheet laminator is preferred, because it eliminates trim waste and provides an exposed copper border around all four sides of the panels.

Recommended lamination parameters depend on the surface profile of the copper and imaging requirements. For examples, preheating, slow laminating speed and higher pressure may be needed for fine line applications. Although specific lamination parameters should be established based on experience for each application, the recommendations in Table 1 provide general guidelines.

Table 1.

### **Recommended parameters**

<b>MANUAL LAMINATOR</b>	
<b>Roll temperature</b>	<b>90~120° C (194~248° F)</b>
<b>Roll speed</b>	<b>1.0~3.0m/min (3~10feet/min)</b>
<b>Air assist pressure</b>	<b>35~50psi</b>
<b>Exit temperature</b>	<b>40~65° C (105~149° F)</b>
<b>AUTOMATIC CUT- SHEET LAMINATOR</b>	
<b>Roll temperature</b>	<b>90~130° C (194~266° F)</b>
<b>Roll speed</b>	<b>1.0~3.0m/min (3~10feet/min)</b>
<b>Air assist pressure</b>	<b>35~50psi</b>
<b>Exit temperature</b>	<b>40~65° C (105~149° F)</b>
<b>Seal temperature</b>	<b>60~80° C (140~176° F)</b>
<b>Seal pressure</b>	<b>3.0~5.0 kg/cm<sup>2</sup></b>
<b>Seal time</b>	<b>1~4 sec</b>

### **Cleanliness**

The panels and the lamination rolls must be clean to prevent pinholes caused by dirt, copper and epoxy-glass slivers and resists chips.

### **Handling and Hold Times**

After lamination, panels should be racked with spaces between each panel. Allow the

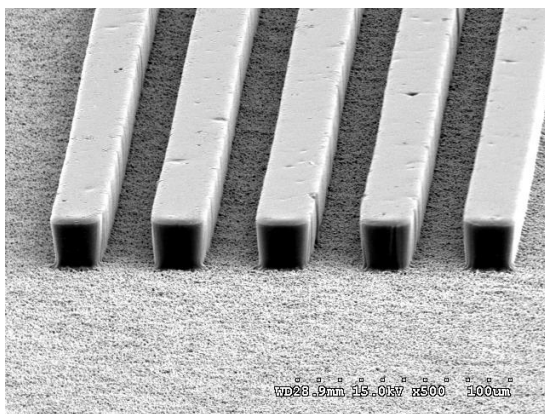
panels to cool to room temperature prior to exposure. Panels should never be stacked on top of each other, as this will cause trapped dirt particles to imprint the resist from one board to the next. Stacking also traps heat and interferes with resist performance during exposure or development.

**Conformation**

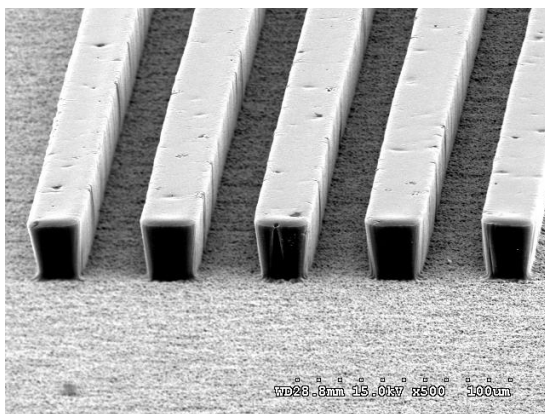
In print-and-etch and tent-and-etch applications, surface defects such as pits, dents, scratches and weave dominance will cause defects such as opens, cuts and dishdowns. In pattern plating application, these same surface defects will cause shorts and copper residue. **LAMINAR® UDF7200M DRY FILM PHOTORESIST** has excellent conformation capabilities to overcome these surface defects and will help improve yields. Of course, conformation also can be improved by:

- preheating the panels
- increasing lamination pressure
- increasing lamination temperature
- slowing lamination speed
- using thicker film

Too much pressure, higher roll temperature and preheating can force dry film into holes thinning the resist at the rim of the hole and resulting in tent breakage. Lamination parameters should be carefully evaluated when the panels have large tent holes.



UDF7225M 375nm/405nm=100/0  
41ST=19 ,L/S=24um



UDF7230M 375nm/405nm=100/0  
41ST=19 ,L/S=26um

**EXPOSURE:**

- **LAMINAR® UDF7200M DRY FILM PHOTORESIST** has a good response in the 365nm and 405 nm wavelength. Processing in yellow light area is required from lamination to development.

**Exposure parameters**

Resist type	UDF7215M	UDF7215M	UDF7215M
Exposure energy set mode	375nm/405nm : 100/0	375nm/405nm : 50/50	375nm/405nm : 0/100
Exposure energy (mj/cm <sup>2</sup> ) :	9~17 mj/cm <sup>2</sup>	11~22 mj/cm <sup>2</sup>	16~31 mj/cm <sup>2</sup>
Stouffer 21 step tablet: resist	6 – 8	6 - 8	6 - 8
Copper	7 – 9	7 – 9	7 – 9
Stouffer 41 step tablet : resist	16 – 22	16 – 22	16 – 22
Copper	17 – 23	17 – 23	17 – 23

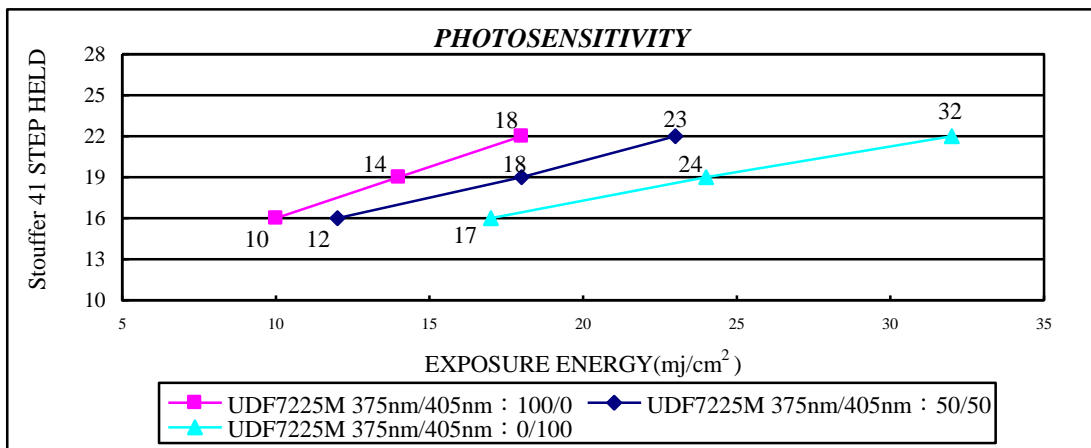
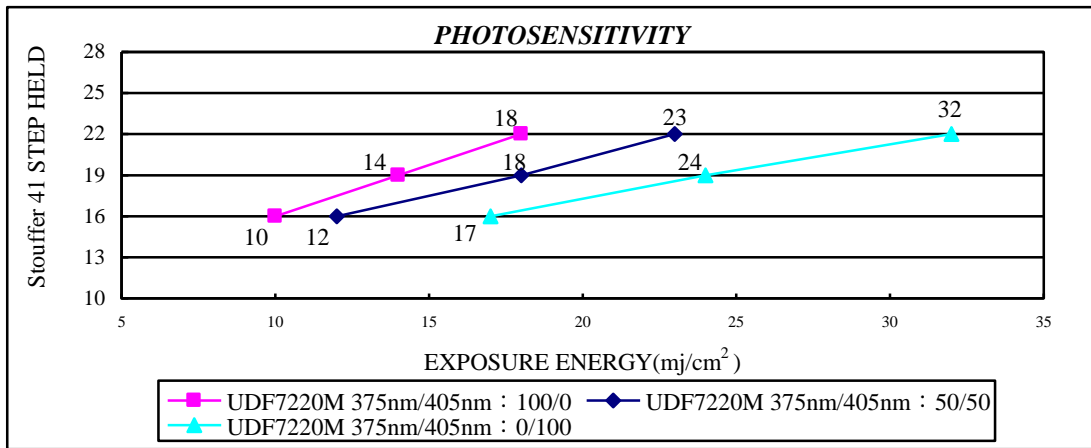
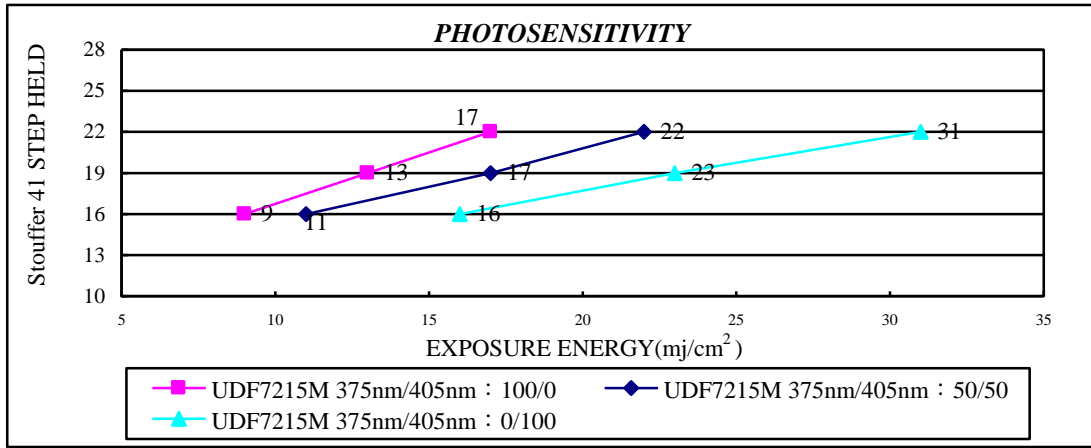
Resist type	UDF7220M	UDF7220M	UDF7220M
Exposure energy set mode	375nm/405nm : 100/0	375nm/405nm : 50/50	375nm/405nm : 0/100
Exposure energy (mj/cm <sup>2</sup> ) :	10~18 mj/cm <sup>2</sup>	12~23 mj/cm <sup>2</sup>	17~32 mj/cm <sup>2</sup>
Stouffer 21 step tablet: resist	6 – 8	6 - 8	6 - 8
Copper	7 – 9	7 – 9	7 – 9
Stouffer 41 step tablet : resist	16 – 22	16 – 22	16 – 22
Copper	17 – 23	17 – 23	17 – 23

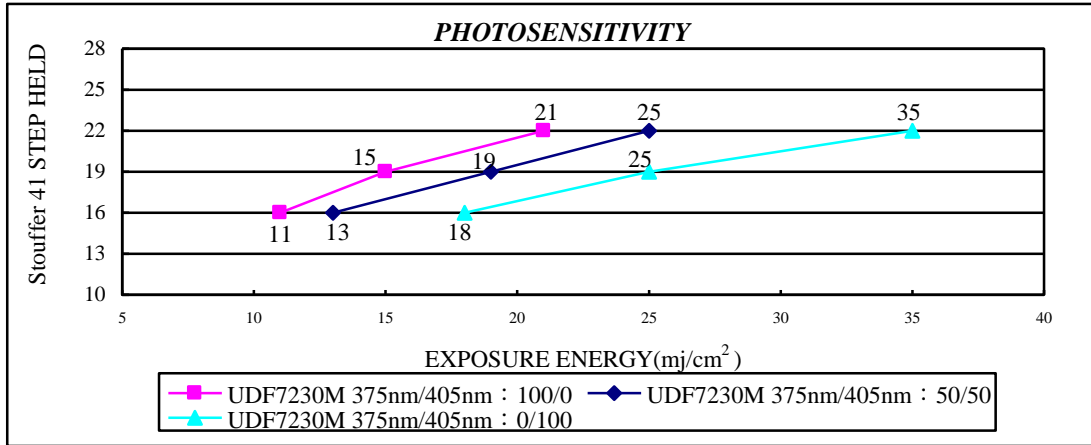
Resist type	UDF7225M	UDF7225M	UDF7225M
Exposure energy set mode	375nm/405nm : 100/0	375nm/405nm : 50/50	375nm/405nm : 0/100
Exposure energy (mj/cm <sup>2</sup> ) :	10~18 mj/cm <sup>2</sup>	12~23 mj/cm <sup>2</sup>	17~32 mj/cm <sup>2</sup>
Stouffer 21 step tablet: resist	6 – 8	6 - 8	6 - 8
Copper	7 – 9	7 – 9	7 – 9
Stouffer 41 step tablet : resist	16 – 22	16 – 22	16 – 22
Copper	17 – 23	17 – 23	17 – 23

Resist type	UDF7230M	UDF7230M	UDF7230M
Exposure energy set mode	375nm/405nm : 100/0	375nm/405nm : 50/50	375nm/405nm : 0/100
Exposure energy (mj/cm <sup>2</sup> ) :	11~21 mj/cm <sup>2</sup>	13~25 mj/cm <sup>2</sup>	18~35 mj/cm <sup>2</sup>
Stouffer 21 step tablet: resist	6 – 8	6 - 8	6 - 8
Copper	7 – 9	7 – 9	7 – 9
Stouffer 41 step tablet : resist	16 – 22	16 – 22	16 – 22
Copper	17 – 23	17 – 23	17 – 23

- A minimum 10 – 15 minutes hold time after exposure prior to development.

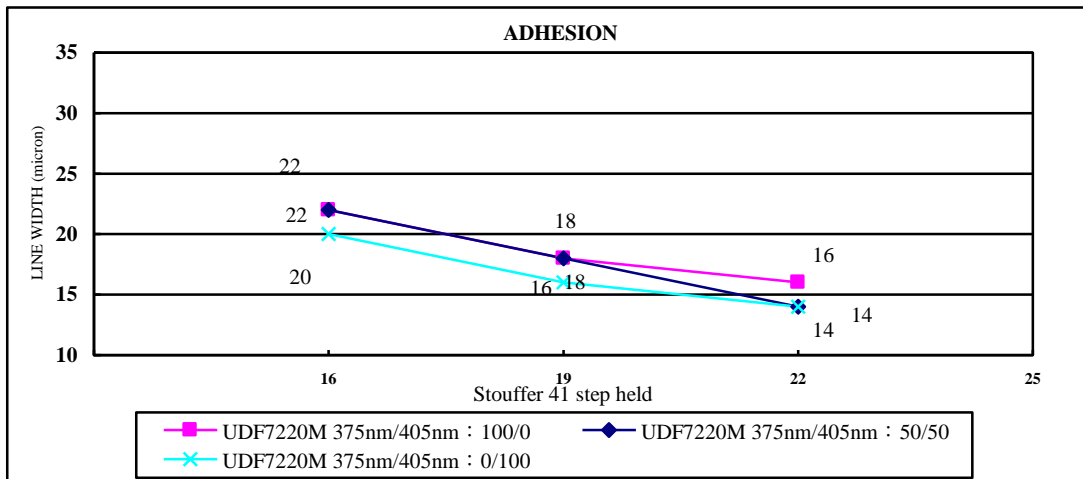
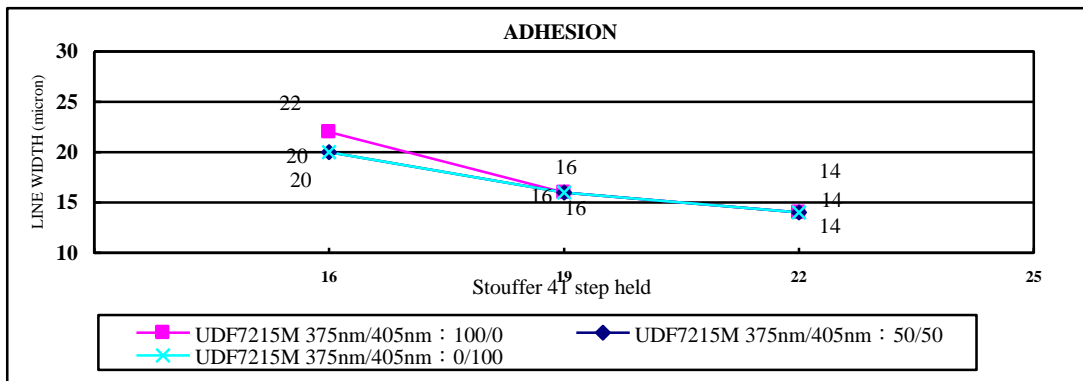
**Figure 1. Photosensitivity**

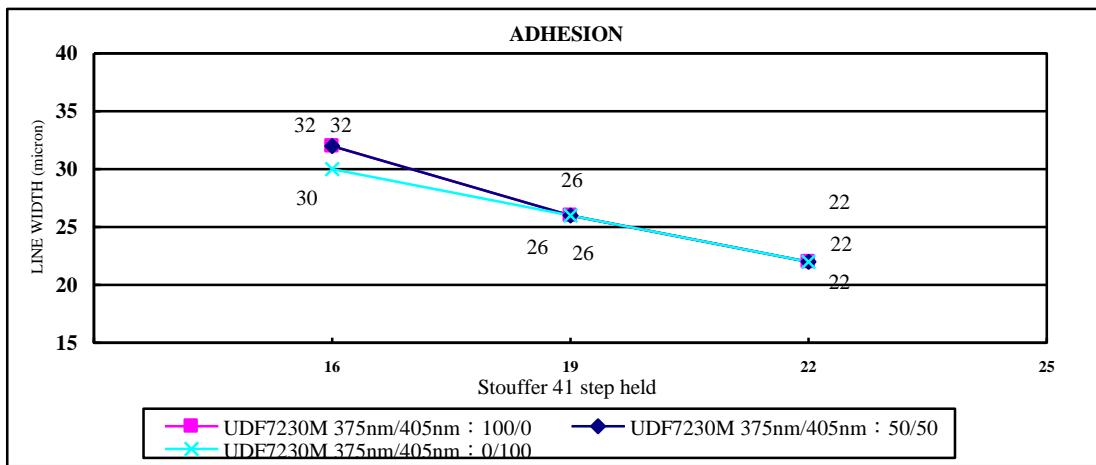
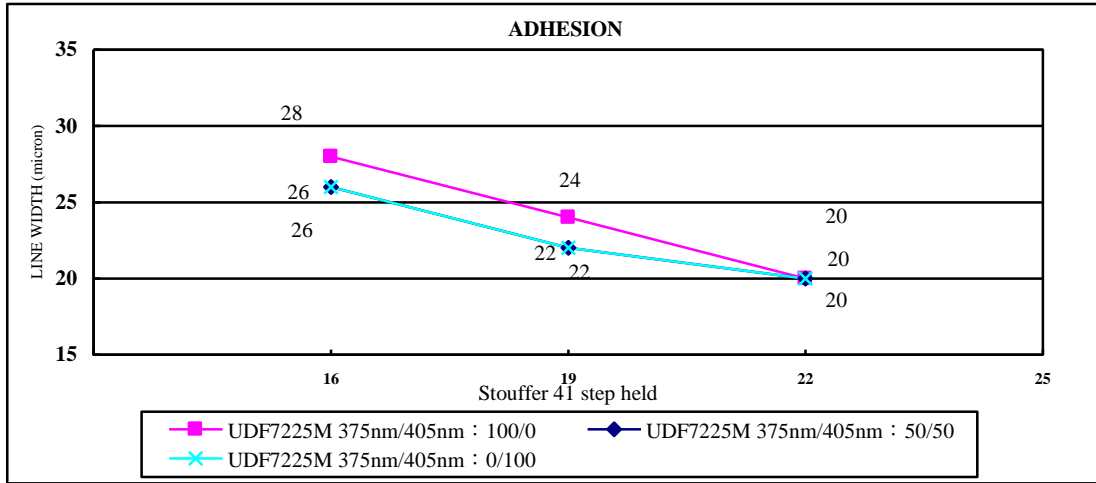




**Printer : Nuvogo800**

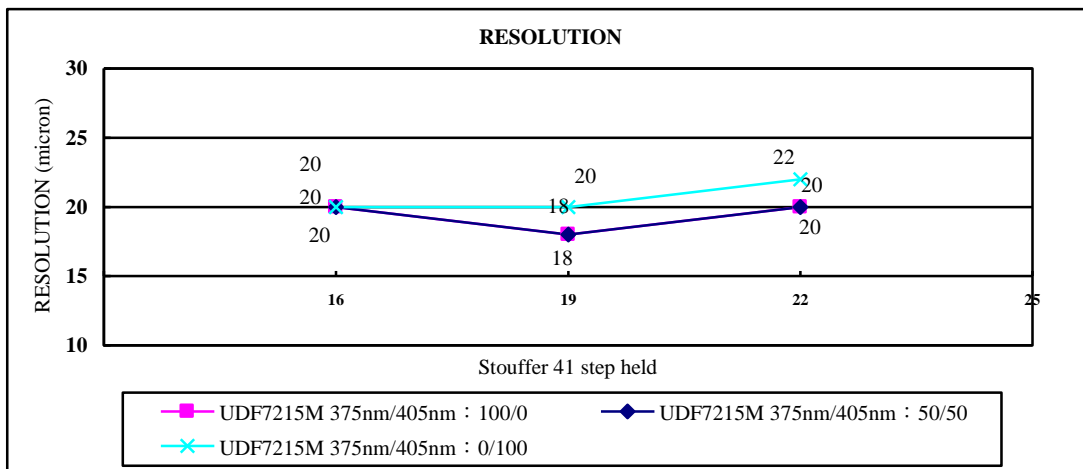
**Figure 2. Fine line adhesion**

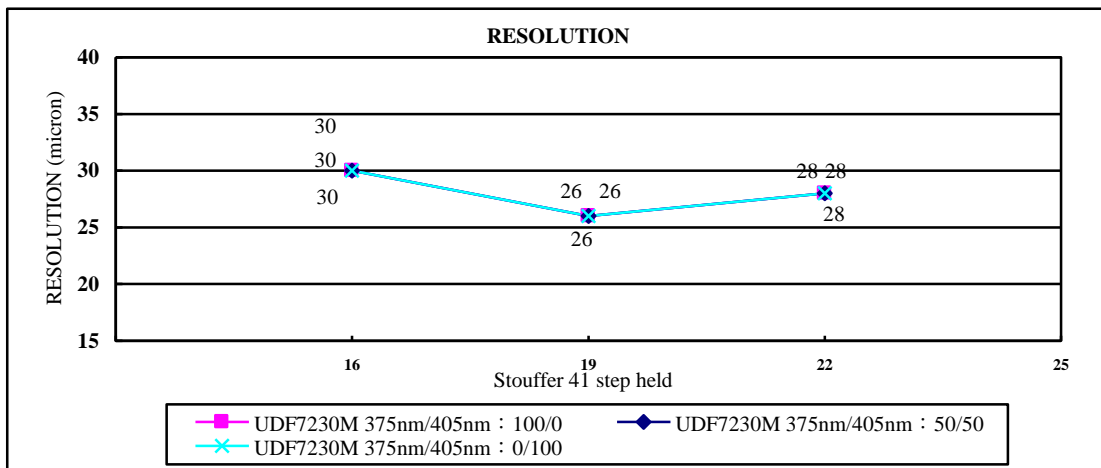
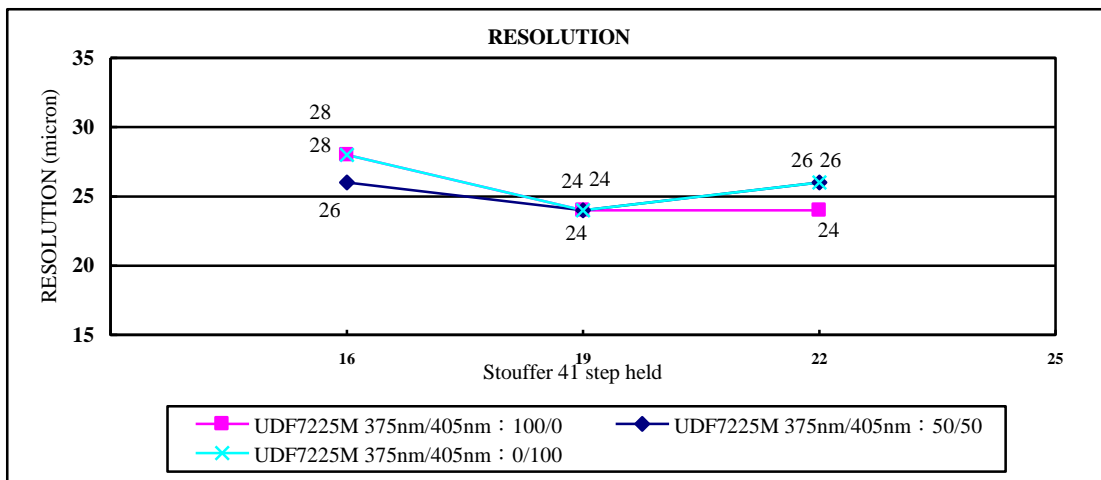
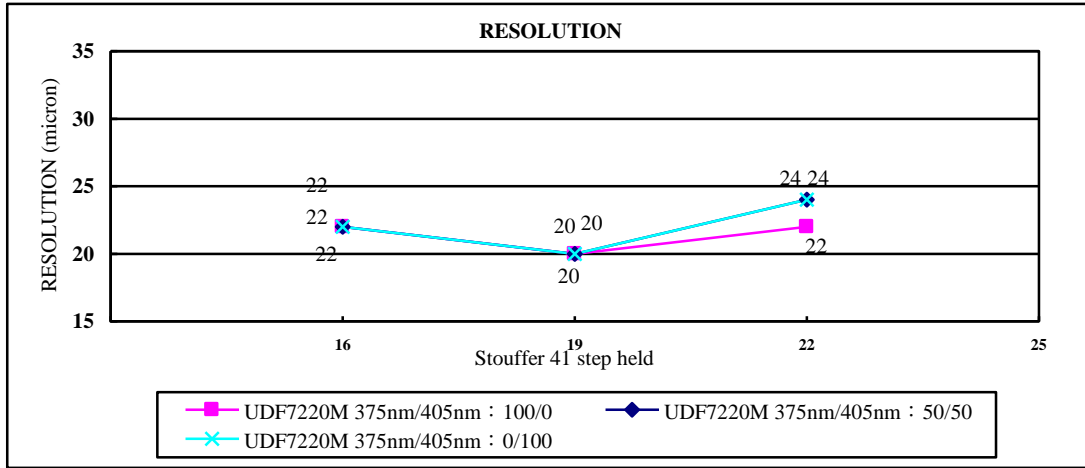




\*Lines/Spaces = X/400 μ m  
 Printer : Nuvogo800

Figure 3. Resolution





**\*Lines/Spaces = X/X**  
**Printer : Nuvogo800**



## DEVELOPMENT

ETERTEC<sup>®</sup> UDF7200M dry film can be developed in carbonated based solution.

### *Developing operation conditions*

	optimum	range
<b>Developer solution:</b>		
<b>Sodium Carbonate</b>	<b>0.85%</b>	<b>0.7~1.0%</b>
<b>Potassium Carbonate</b>	<b>1.0%</b>	<b>0.8~1.2%</b>
<b>Temperature</b>	<b>28~30°C (82~86°F)</b>	<b>25~34°C (77~93°F)</b>
<b>Breakpoint</b>	<b>55%</b>	<b>50~70% of the chamber length</b>
<b>Pressure</b>	<b>1.5~1.7 kg/cm<sup>2</sup></b>	<b>1.5~2.0 kg/cm<sup>2</sup> (22~30 psi)</b>
<b>Nozzles</b>	<b>high impact direct fan or cone</b>	
<b>Rinse water</b>	<b>hard water ( 150 – 300 ppm CaCO<sub>3</sub> equivalent)</b>	
<b>Rinse spray pressure</b>	<b>2.0 kg/cm<sup>2</sup></b>	<b>1.2~2.5 kg/cm<sup>2</sup></b>
<b>Rinse temperature</b>	<b>20~25 °C</b>	<b>15~30 °C</b>
<b>Drying</b>	<b>hot air blow preferred</b>	
<b>Developing time</b>	<b>UDF7215M: 16~24 seconds (28° C)</b> <b>UDF7215M: 20~28 seconds (28° C)</b> <b>UDF7225M: 22~30 seconds (28° C)</b> <b>UDF7230M: 26~34 seconds (28° C)</b>	

### *Resist Loading:*

Figure 4. Shows the effect of resist loading on the fall off in the pH of the developer solution. The breakpoint will increase as the resist loading increase in the developer solution. This will cause incomplete developing resulting in resist scum and bad resolution.

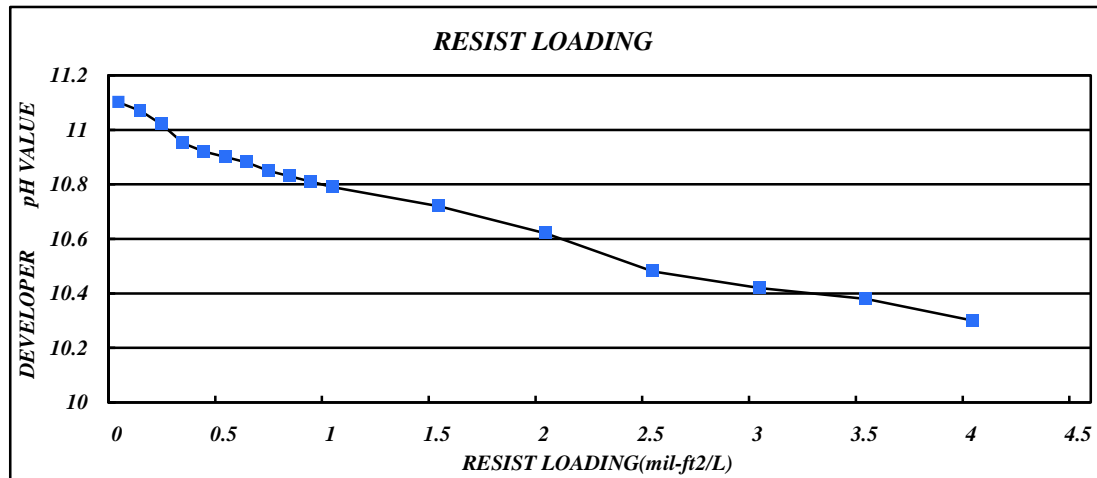
In a batch solution, the resist loading is 3.2 ~ 4.0 mil·ft<sup>2</sup>/ L (12 ~ 14 mil·ft<sup>2</sup>/ gal). Developer solution should be replaced as resist loading up to this high level. Use flowing guidelines to change solution.

- pH falls to 10.3.
- Developing time becomes 30% longer than that for fresh solution.

In a feed-and-bleed system, the resist loading is held constant by feeding fresh developer to developer sump. The recommended loading limit in automatic replenishment system is 1 ~ 2 mil·ft<sup>2</sup>/ L. And the pH value of the developer solution

will be controlled at the range of 10.8 to 10.6.

**Figure 4.**



### **Antifoam**

If it is required, suitable antifoam can be added at a ratio of 0.1 – 0.5 ml per liter.

### **Maintenance**

The developer chambers should be cleaned periodically. Resist residue can be removed by 3 – 5% NaOH solutions. Scale cPostan be cleaned with dilute acid.

## **ETCHING**

**LAMINAR ® UDF7200M** dry film photoresist can be performed well in acid and alkaline etchants.

## **STRIPPING**

**LAMINAR ® UDF7200M** dry film photoresist can be stripped in conventional immersion or conveyORIZED process. Stripper can be 2.0% ~ 5.0% caustic solutions (sodium hydroxide or potassium hydroxide) or proprietary stripping solutions.

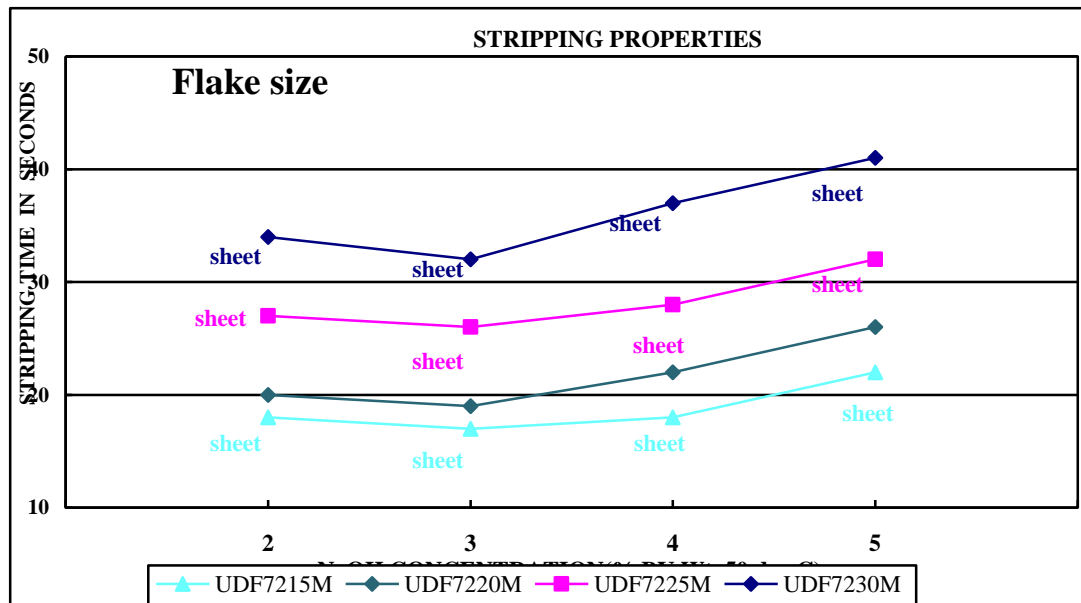
### Stripping parameters

Type	UDF7215M	UDF7220M	UDF7225M	UDF7230M
Time	17~22 sec	20~27 sec	26~32 sec	32~41 sec
Temperature	40~60° C (104~140°F)	40~60° C (104~140°F)	40~60° C (104~140°F)	40~60° C (104~140°F)
Pressure	1.0~3.0 kg/cm <sup>2</sup> (15~45 psi)	1.0~3.0 kg/cm <sup>2</sup> (15~45 psi)	1.0~3.0 kg/cm <sup>2</sup> (15~45 psi)	1.0~3.0 kg/cm <sup>2</sup> (15~45 psi)
Concentration	2~5% NaOH solution	2~5% NaOH solution	2~5% NaOH solution	2~5% NaOH solution

Actual stripping times are influenced by:

- Concentrations of caustic solution
- Stripping temperature
- The height of plating overhang
- Spray pressure
- Exposure level
- Hold time prior to stripping

*Fig 5. Stripping time*



### SAFETY AND HANDLING:

1. Avoid skin contact with unexposed resist and wash thoroughly with soap and water if contact is made.
2. Dry film lamination may cause vapors to be generated. A well-ventilated room is necessary.
3. Open resist only in a controlled yellow light area.

**4. Do not reuse the dry film release sheets or cover sheets.**

**5. Read MSDS prior to using and handling LAMINAR ® UDF7200M series dry film photoresist.**

## **STORAGE:**

Store in a cool, dry location 5°C to 20°C (41°F to 68°F) and 50 % relative humidity ±10% to assure maximum shelf life and product performance.

## **WARRANTY**

The information contained herein is correct to the best of our knowledge. The recommendations or suggestions contained in this bulletin are made without guarantee or representation as to results. We suggest that you evaluate these recommendations and suggestions in your laboratory prior to use. Our responsibility for claims arising from defects in material or workmanship or any other breach of warranty, negligence or otherwise is limited to the purchase price of the material.