General Information

*Found: 1994.10.28

*Capital: 792,213K NTD (~26 Million USD)

*Operation Sites:

*Head Quarter: Kaohsiung, Taiwan

*Taipei Factory: Taipei, Taiwan

*Shanghai Sales office: Shanghai, China.

*Dong Guan Factory: Guan Dong, China.

*Wuxi Factory: Wuxi, China
1994 : E&R was established
1996 : Fully automatic IC laser marking machine, BLAZON-1600, was launched
1998 : Plasma Cleaner, Plasmax-800, for BGA applications, was launched
1998 : Business of carrier tape for SMD was start-up
2001 : Awarded by Philips semiconductor as the best supplier of equipment
2003 : Awarded by OSE as the best supplier of equipment
2007 : Awarded by Philips semiconductor as the best supplier of carrier tape
2008 : Market share of IC laser marking equipment was number one in Taiwan
2008 : Market share of carrier tape was number one in China
2009 : Pioneer of laser micromachining for applications of Silicon, ITO, ceramics and glass
2010 : Awarded by ASE as the best supplier of equipment
2014 : The only supplier of laser machine to the worldwide leading company of smart watch
2015 : IPO in Taipei Exchange
2016~ : Laser wafer marker, laser wafer cutting machine, microwave plasma cleaner was launched
E& R Kaohsiung Taiwan


- FPC Equipment: Laser cutting/Drilling M/C, Film Laminators, Roll to Roll Handling system.

- LED Equipment: plasma cleaner, Ceramic Laser Driller, Ceramic Laser Marking M/C.

- Display Equipment: Laser patterning M/C, Laser Glass cutting M/C.
E& R Taipei

• FPC (Flexible printing Circuit Board) and module manufacturing and sales

E& R Shanghai

• Sales and Services, China

E& R Dong-Guan

• Carrier Tape Manufacturing and Sales

E& R Wuxi

• Carrier Tape Manufacturing and Sales
Excellent & Reliable

Product Introduction

Laser Equipment

Plasma Equipment

SMD Packing Materials

FPC Equipment

Core Technologies
<table>
<thead>
<tr>
<th>Products</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Laser Strip Marker</td>
<td>IC Marking for final product.</td>
</tr>
<tr>
<td>2 Laser wafer marker</td>
<td>IC Marking for in-process traceability.</td>
</tr>
<tr>
<td>3 Laser Package cutting Machine</td>
<td>Cut the whole substrate into individual units.</td>
</tr>
<tr>
<td>4 FPC Laser Cutting Machine</td>
<td>FPC cutting</td>
</tr>
<tr>
<td>5 Laser Wafer Scribing/Cutting Machine</td>
<td>Cut the whole wafer into individual units.</td>
</tr>
</tbody>
</table>
Key application, Laser

- Cutting / Scribing
- Marking
- Ceramic Substrate
  - Cutting/scribing
  - Micro via drilling

- Micro via drilling
- Cutting
- Sapphire cutting
  - glass cutting
  - ITO patterning

- FPC/HDI
- Panel
- Application
Excellent & Reliable

Laser Wafer Cutting Machine
Excellent & Reliable

Laser Wafer Marking Machine
Laser FPC Rapid Cut-L200D
### Plasma Development Products Application

<table>
<thead>
<tr>
<th></th>
<th>Products</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Batch Type RF Cleaner</td>
<td>Surface activation, Remove metal oxide, improve bondability</td>
</tr>
<tr>
<td>2</td>
<td>IN-Line RF Cleaner</td>
<td>Surface activation, Remove metal oxide, improve bondability</td>
</tr>
<tr>
<td>3</td>
<td>Microwave Plasma Cleaner</td>
<td>Surface activation, Remove metal oxide, improve bondability</td>
</tr>
<tr>
<td>4</td>
<td>Microwave Etcher De-flash、Descum</td>
<td>Remove epoxy residue, Remove PR residue.</td>
</tr>
<tr>
<td>5</td>
<td>Microwave Plasma Dicing/THIN</td>
<td>Cut the whole wafer into individual units</td>
</tr>
</tbody>
</table>
Excellent & Reliable

Key application, plasma

Application

Batch type, 800A
Batch type, 800C

Pannel type 600S
strip to strip type 600

LF, RF and Micro-Wave all available for request

Contact Angel Before and After
Excellent & Reliable

Microwave Plasma Cleaner Plasmax-MW 300
Excellent & Reliable

FPC Equipment

- Roll to Roll Handling Equipment
- FPC Cu Wet Etching
- PCB AOI Inspection
- Film Laminator
Core Technical

- Automation of E&R
- IT Integrations
Excellent & Reliable

Automation of E&R

- AOI
- Mechanical design
- Automation
- PC/PLC control
- IT Integrations
New Technology
For
Wafer Level
Excellent & Reliable

Wafer Back Side Marker for 8”/12” Silicon Wafer

8”, 12” black coated wafer

6”, 8” mesh wafer

6”, 8” thin metal coated wafer

12” gold coated wafer

8”, 12” SIN Silicon wafer with tape before marking

8”, 12” polish silicon

8”, 12” bare Si grinded
Excellent & Reliable

**Wafer Marker for 8” Glass Substrate**

1. 2x2 2D - Full Type And Good Reading from 2D
2. No “HAZ” and slag found
Excellent & Reliable

Glass Inner Alignment Mark

3X

3X

3X
Wafer Cutting & Scribing
Excellent & Reliable

Wafer Level cutting & Scribing

- Straight & round cut trajectories
- Cutting speed: >200mm/sec, straight edge
- Chipping: <10um, straight edge
- Roughness, sidewall: Ra <1um
- Thickness of glass: 0.3~1.1mm

Molding compound
Glass
5mm
Excellent & Reliable
Wafer Level cutting & Scribing

- Die Size: 1.1x0.7mm
- Dicing street: 90um

<table>
<thead>
<tr>
<th>Scribing speed (mm/sec)</th>
<th>184</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trench width(um)</td>
<td>76.4</td>
</tr>
<tr>
<td>Trench depth(um)</td>
<td>2.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scribing speed (mm/sec)</th>
<th>990</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trench width(um)</td>
<td>17</td>
</tr>
<tr>
<td>Trench depth(um)</td>
<td>2.4</td>
</tr>
</tbody>
</table>
Excellent & Reliable

**Wafer Level cutting & Scribing**

- Si cutting speed: >150 mm/s
- roughness: Ra < 1um

- Polymer, 10um
- Si, 50um
- DAF, 10um

- DAF splashed on sidewall, ns laser
- DAF cut neatly, fs laser
Internal Scribing .. Fan-out wafer

- Glass cutting speed: 200mm/s
- Roughness: Ra < 1µm
Wafer Marking
Excellent & Reliable

Wafer Laser Marking

- Features
  - Chip marking & Wafer ID marking
  - Through tape marking
  - Bare wafer marking: Grinding/Polishing & metal surface
  - Warpage eliminator
Excellent & Reliable

Wafer Laser Marking

➢ Through-tape marking

Before tape remove

After tape remove
Excellent & Reliable

Wafer Laser Marking .. Tiny Character - 0.1mm
Wafer Plasma
Equipment overview

CRM-300R
Compound Residue Removal - substrate

Residue must be thoroughly removed from bumps, but still keep dicing streets fully covered with compound.

Before plasma

After plasma
Excellent & Reliable

Compound Residue Removal - Bumping wafer

Solution:

Before Plasma

After Plasma

Before plasma

After plasma
For bumping process of copper pillar, photoresist residue can’t be fully removed by wet chemicals and remains on the UBM pads. These residue will impede the subsequent copper electroplating process and cause defects.

CRM-300 Series can fully remove residue to raise the yield of copper pillar bumping, through descum process.
~THANK YOU~