Molecule Gradient Adhesive Tape
3-layer PSA process
**Design Philosophy 1**

★Structure: Multi layer gradation structure

1\textsuperscript{st} layer : low molecular acrylic adhesive layer
2\textsuperscript{nd} layer : polymer special adhesive layer
3\textsuperscript{rd} layer : low molecular acrylic adhesive layer

Structure:

- Excellent die cut
- No affect by the adhesive
- Thin gauge possible

![Diagram showing the multi-layer gradation structure](image)
Replacing the typical double adhesive tape

- **Rayon non woven double adhesive tape**
  - Adhesive layer 40 µm
  - Rayon non woven layer 60 µm (adhesive impregnated)
  - Adhesive layer 40 µm

- **PET based double adhesive tape**
  - Adhesive layer 22.5 µm
  - PET film 5 µm
  - Adhesive layer 22.5 µm
Features

1. By applying gradation to the molecular weight with the same kind of resin from the center to the outside, it increases the interlayer strength and creates a very strong bonding force.

2. The outer adhesive layer has selected a special low molecular weight adhesive layer that adheres well to adherends (dissimilar materials).
Applications

★ Fixing LCD panel
★ Fixing LCD module and the back light
★ Fixing digital and Movie camera’s Lens
★ Fixing Mesh, Non woven and cushion substrates
★ Fixing Light shielding film
★ Use as a spacer
★ Fixing Brand name plate
★ Adhering Polyimide film and the copper substrate.
Product Application

★ Fixing human machine interface parts

★ Fixing of seat heat sensor

★ Waterproof fixing of smartphone / Tablet parts

★ Waterproof fixing of digital camera parts
Application for Touch sensor

Display touch sensor
# Products & Characteristic

<table>
<thead>
<tr>
<th>Product</th>
<th>Thickness (t=mm)</th>
<th>Color</th>
<th>Peel adhesive SUS</th>
<th>Heat holding power ºC</th>
</tr>
</thead>
<tbody>
<tr>
<td>200A30 (954-3)</td>
<td>0.03</td>
<td>Transparent</td>
<td>9</td>
<td>150</td>
</tr>
<tr>
<td>200A50 (954-5)</td>
<td>0.05</td>
<td>Transparent</td>
<td>17</td>
<td>150</td>
</tr>
<tr>
<td>300Z300B</td>
<td>0.3</td>
<td>Black / White</td>
<td>44</td>
<td>150</td>
</tr>
<tr>
<td>400Z300B</td>
<td>0.3</td>
<td>Black / White</td>
<td>28</td>
<td>150</td>
</tr>
</tbody>
</table>
# Product advantage

Molecular gradient Double-coated tape is superior to substrate-less and double-sided tape with substrate.

【Evaluated】

## Molecule Gradient tape (300A100/954-10)
- PET carrier tape
- Non carrier tape

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Peel force(180°) N/inch</th>
<th>Shearing force (N/cm²)</th>
<th>Shear creep resistance (mm)</th>
<th>Impact resistance (J/3.2cm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>300A-100 (954-10)</strong></td>
<td>1</td>
<td>28.6</td>
<td>&gt;100</td>
<td>0.0</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>30.5</td>
<td>&gt;100</td>
<td>0.0</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>29.8</td>
<td>&gt;100</td>
<td>0.0</td>
<td>0.02</td>
</tr>
<tr>
<td><strong>PET Carrier Tape</strong></td>
<td>1</td>
<td>20.1</td>
<td>99.0</td>
<td>0.0</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>19.7</td>
<td>95.0</td>
<td>0.0</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>21.1</td>
<td>92.0</td>
<td>0.0</td>
<td>0.02</td>
</tr>
<tr>
<td><strong>Non Carrier Tape</strong></td>
<td>1</td>
<td>21.4</td>
<td>90.0</td>
<td>1.0</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>23.3</td>
<td>90.0</td>
<td>1.0</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>23.2</td>
<td>85.0</td>
<td>1.0</td>
<td>0.01</td>
</tr>
<tr>
<td><strong>Ave</strong></td>
<td></td>
<td>29.6</td>
<td>&gt;100</td>
<td>0.0</td>
<td>0.03</td>
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### Peel adhesive

- 0.1mm thickness

### Test Parameters

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<tr>
<th>Materials</th>
<th>SUS plate</th>
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<tr>
<td><strong>Assembly Procedure-Rolled</strong></td>
<td>Rolled 2-times</td>
</tr>
<tr>
<td>Force</td>
<td>20N</td>
</tr>
<tr>
<td>Speed</td>
<td>300mm/s</td>
</tr>
<tr>
<td><strong>Test Conditions</strong></td>
<td></td>
</tr>
<tr>
<td>Peel Speed</td>
<td>300mm/min</td>
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<tr>
<td>Temperer</td>
<td>23°C</td>
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### Shearing force

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<td>200mm/min</td>
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### Shear creep resistance

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</tbody>
</table>
Chemical structure of 3-layer adhesive

Chemical structure of outer layer adhesive

\[
\left(\begin{array}{c}
C=O \\
O \\
R_1
\end{array}\right)_{n_1} \quad \left(\begin{array}{c}
C=O \\
O \\
R_2
\end{array}\right)_{n_2} \quad \left(\begin{array}{c}
C=O \\
O \\
R_3
\end{array}\right)_{n_3}
\]

R1= C6-C8 alkyl group  R2= butyl group  
R3=hydroxy group or amino group

Chemical structure of mid-layer adhesive

\[
\left(\begin{array}{c}
C=O \\
O \\
R_1
\end{array}\right)_{n_1} \quad \left(\begin{array}{c}
C=O \\
O \\
R_2
\end{array}\right)_{n_2} \quad \left(\begin{array}{c}
C=O \\
O \\
R_3
\end{array}\right)_{n_3}
\]

R1= C6-C8 alkyl group  R2= butyl group  
R3=amino or Glycidyl group
Chemical reaction between outer layer to mid-layer

In case of mid-layer has Glycidyl group

\[
\begin{align*}
\left\{ \begin{array}{c}
\text{CH} \\
\text{C} = \text{O} \\
\text{O} \\
\text{R}
\end{array} \right\}^n \left\{ \begin{array}{c}
\text{CH} \\
\text{CH}_2 \\
\text{CH}_2 \\
\text{CH}_2
\end{array} \right\}^m
\end{align*}
\]
Manufacturing method of adhesive tapes

Coating method

The separator (blue) delivered from "Unwind" is coated with a certain coating thickness with "coater" (adhesive application part).
After “Drying” the solvent component of the “Film”, it is “Laminated” with the material (base material etc.) (red) which is fed out from the vicinity of the dryer outlet.
And “Wind-up” them (purple).
Manufacturing method

Our technology not only “Lamination" "Multi layer coating" is also possible.

Lamination

Multi layer coating
Outline of process

The process consists of three sections: forming, drying, and winding.

Forming section → Drying section → Winding section
In the forming process three raw materials provide by each pumps to extruder.
In the drying section the formed 3-layer dried suitable condition by dryer machines.
In the winding section the formed 3-layer winds suitable condition by winding machines.
User is responsible for determining whether the KGK product is fit for a particular purpose and suitable for user’s method of application. Please remember that many factors can affect the use and performance of a KGK product in a particular application. The materials to be bonded with the product, the surface preparation of those materials, the product selected for use, the conditions in which the product is used, and the time and environmental conditions in which the product is expected to perform are among the many factors that can affect the use and performance of a KGK product. Given the variety of factors that can affect the use and performance of a KGK product, some of which are uniquely within the user’s knowledge and control, it is essential that the user evaluate the KGK product to determine whether it is fit for a particular purpose and suitable for the user’s method of application.

KGK make no warranties on above data.