Hitachi Anisotropic Conductive Film
ANISOLM®
AC-7206U-18

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R & D Dept.
Goshomiya Works
Hitachi Chemical Co., Ltd.
### Standard Specification, Bonding and Storage Conditions, Repairability, and Characteristics

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>AC-7206U</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smallest connection circuit</td>
<td>Line</td>
<td>m</td>
<td>pcs</td>
</tr>
<tr>
<td>Spacing Resolution</td>
<td>m</td>
<td>/mm</td>
<td>25</td>
</tr>
<tr>
<td>Thickness</td>
<td>m</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Width</td>
<td>mm</td>
<td>1.2,1.5,1.8,2.0,2.5</td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>m</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>Color</td>
<td>-</td>
<td>Transparent(gray)</td>
<td></td>
</tr>
<tr>
<td>Core</td>
<td>mm</td>
<td>18.5</td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>ºC</td>
<td>80 ºC to 10 ºC</td>
<td>ANISOLM's ultimate temperature</td>
</tr>
<tr>
<td>Pressure</td>
<td>MPa</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>s</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>ºC</td>
<td>170 ºC to 10 ºC</td>
<td>ANISOLM's ultimate temperature</td>
</tr>
<tr>
<td>Pressure</td>
<td>MPa</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>s</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Packed</td>
<td>-</td>
<td>6 months after date of manufacture when stored at -10 to 5 ºC</td>
<td></td>
</tr>
<tr>
<td>Unpacked</td>
<td>-</td>
<td>1 month at 25 ºC or below and 70%RH or below</td>
<td></td>
</tr>
<tr>
<td>Pre-bonded</td>
<td>-</td>
<td>2 months at -10 to 5 ºC, 1 month at 25 ºC or below and 70%RH or below</td>
<td></td>
</tr>
<tr>
<td>Repairability</td>
<td>-</td>
<td>Repairable</td>
<td>By acetone or toluene</td>
</tr>
</tbody>
</table>

**Notes:**
1) Take ANISOLM out of the refrigerator or other storage without taking it out of its hermetic containers. Leave the ANISOLM in the containers at room temperature for about an hour. Then make sure that it does not risk condensation before using it.
2) Connection resistance: The table indicates a half of the resistance between neighboring circuits. Current measured: 1mA. Includes the circuit resistances of the FPC and ITO glass.
3) Tack strength: Pre-bond an ANISOLM sample to an ITO glass, peel its separator off, then tack s FPC to it at room temperature. Then measure the tack strength of this sample.
4) Operating range: As per reliability tests using Hitachi's test pieces. (This range varies according to the material used and external stress applied. Check the reliability of specific pieces.)

The values given above represent typical measurements, not guaranteed ones.
2. Precautions in Bonding

2.1. Connection time and ANISOLM temperature (Typical)

Head temperature: 305 °C
TCP: Pl, 75 μm; Cu, 18 μm; Au plating
Glass board: 1.1mm
Ratio of temperature reached 5 seconds later: 90% or more of the ultimate temperature (°C)

2.2. Measuring ANISOLM temperature

2.3. Heat/Pressure Head

(1) Adjust carefully the eveness and parallelism of the heating head to keep the equal pressure.
(2) Use a head slightly wider than the ANISOLM piece to be connected.
   - Example: ANISOLM width, 2.5mm; head width, 3.0mm
(3) Tip the head with a thin and hard cushion, not a soft and thick one. Silicon rubber (about 0.2 mm thick with a hardness of 70 degrees or above) may be used for example. The use of too soft a cushion or excessive pressure in connection will drive adhesive in the space toward the end, resulting in insufficient adhesion. Be particularly careful when the space is wider than the circuits.

2.4. Misalignment of Opposite Circuits

(1) Align opposite circuits well. Do not let them get misaligned.
(2) In designing TABs (FPCs), allow for the misalignment of opposite circuits due to their expansion during connection.
(3) Keep the circuit misalignment at or less than the circuit width.
3. Connection Reliability
- Connection circuits
  TCP: Pl, 75 µm; Cu, 18 µm; Sn plating; pitch, 50 µm
  Glass: ITO sputter; 15 / / ; electrodes all over
- Bonding conditions; 170 ° - 3MPa - 20s; ANISOLM width 1.5mm

3.1. Changes in connection resistance in a moisture absorption and freeze test

(-30 °, 60min 70 °, 100min, 95%RH, 60min)

3.2. Changes in connection resistance in a thermal shock test
(-40 °, 30min room temperature, 5min 100 °, 30min)
3.3. Changes in connection resistance in a high-temperature, high-humidity test (85°C, 85%RH)

3.4. Changes in connection resistance in a high-temperature test (100°C)

3.5. Changes in connection resistance in a low-temperature test (-40°C)

AC-7206U-18 changes little in connection resistance over time in various tests, thus a stable connection reliability is obtained.
4. Effect of Bonding Temperature on Connection Reliability

- Connection circuits
  TCP: Pt, 75 μm; Cu, 18 μm; Sn plating; pitch, 50 μm
  Glass: ITO sputter; 15/3; electrodes all over
- Bonding conditions; 155, 170, 185, 3MPa, 20s; ANISOLM width 1.5mm

4.1. Changes in connection resistance in a thermal shock test
(−40 ℃, 30min → room temperature, 5min → 100 ℃, 30min)

4.2. Changes in connection resistance in a high-temperature, high-humidity test (85 ℃, 85%RH)

4.3. Changes in connection resistance in a high-temperature, high-humidity test (85 ℃, 85%RH)

AC-7206U connected at 155 ℃ to 185 ℃ change little in connection resistance over time, thus a stable connection reliability is obtained.
5. Peel Strength
- Connection circuits
TCP: PI, 75 μm; Cu, 18 μm; Sn plating; pitch, 50 μm
Glass: ITO sputter; 1.5 μm; electrodes all over

5.1. Connection Temperature Characteristics of Peel Strength

A high adhesive strength is obtained by bonding at 150°C and above.

5.2. Changes in peel strength in a high-temperature, high-humidity test (85°C, 85%RH)

Our high-temperature, high-humidity test indicated a considerably small decline in the adhesive strength of samples, thus showing the high stability of our product.
6. Insulation Reliability
- Connection circuits
   FPC: Pl, 125 μm; Cu, 12 μm; Ni(2 μm)/Au(0.1 μm) plating; pitch, 100 μm
   Plate: Insulation glass plate
- Measuring method
   Measure the resistance of samples with the condition to 100V DC for 60 seconds.
   Measurement condition: 23 ºC and 65%RH
   Reliability of test condition: High-temperature, high-humidity test (85 ºC, 85%RH)

7. Checking Connection Status

<table>
<thead>
<tr>
<th>Item</th>
<th>Flatness and contact of conductive particles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluating equipment</td>
<td>Metallographic, laser, or electron microscope</td>
</tr>
<tr>
<td>Criteria of judgment</td>
<td>All conductive particles should be flat enough.</td>
</tr>
<tr>
<td>Reason</td>
<td>The flatness of conductive particles when connection is established increases the contact area between the particles and electrodes, resulting in a stable conduction and a high connection reliability.</td>
</tr>
<tr>
<td>Method and action</td>
<td>Use an ANISOLM piece of appropriate thickness according to the thickness and line-to-space ratio of the copper foil, and establish connection under appropriate bonding conditions (temperature, pressure, and time)</td>
</tr>
<tr>
<td>Remark</td>
<td>The flatness of conductive particles in connection and a high connection reliability is obtained when the ANISOLM piece between opposite circuits is 3 micrometers thick at the maximum (when measured with a laser microscope, micrometer, or equivalent).</td>
</tr>
</tbody>
</table>
8. Physical Properties

<table>
<thead>
<tr>
<th>ANISOLM</th>
<th>Elastic modules (GPa)</th>
<th>tan ( \delta ) max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>40 ( \delta )</td>
<td>( ( \delta ) )</td>
</tr>
<tr>
<td>AC-7206U</td>
<td>1.2</td>
<td>125</td>
</tr>
</tbody>
</table>

-Measuring conditions
DVE: hardened specimens (170 \( \delta \), 2min); tensile mode
Frequency, 10Hz; programming rate, 10 \( \delta \)/min.

9. Reaction Rate
-measuring:
Each specimen was heated and hardened in oil kept at a specified temperature for a specified time, the amount of heat generated was measured with a DSC unit, and the reaction rate was determined with the following formula;
Reaction rate = \((Q_0 - Q_T)/Q_0 \times 100\)
\(Q_0\) : initial amount of heat generated
\(Q_T\) : amount of heat generated after hardening