Attention to counterfeit products.
Counterfeit flux core and other inauthentic SMIC solder products have been distributed abroad.
Please purchase genuine SMIC products from SMIC subsidiaries or authorized distributors.
Solder Preform is pre-forms of solid solder alloys with potential to change the future. Combination of machining technologies such as rolling and pressing are used to process the solder alloy into various shapes, allowing the solder to be used effectively. With the evolution of the soldering process, SMIC has developed ECO SOLDER PREFORM that has various structures to help customer's innovation.

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**Line up**

Promote various synergies by selecting from 7 shapes as well as from solder alloy composition and dimensions.

- **Shape**
  - Ribbon
  - Square
  - Disc
  - Washer
  - Ring
  - Chip
  - Wire

Variety of standard shapes including square, washer and disc. Custom shapes and dimensions are available for customer requirements.
Preforms wound in tape reels can be cut into required lengths just prior to mounting.

Reliable heat sealing for areas where paste printing is difficult, preventing uneven heating.

Note) Various shapes and sizes can be made according to customer requirements.

Mounting method for each shape

**Ribbon**
Preforms wound in tape reels can be cut into required lengths just prior to mounting.

Reel winding for easy automated cutting.

**Square**
Fixed amount of solder is supplied to components within a predetermined tolerance range.

Enables identification by matching the pad shapes of substrates and components.

**Disc**
Supplying preform material fit to the soldering pads.

Feeding to where it’s difficult to supply solder paste and flux cored solder.

**Washer**
Reliable heat sealing for areas where paste printing is difficult, preventing uneven heating.

**Other Shapes**
To make other shape, customers’ design drawings and specifications will be required. Please contact us for more details.

Minimum and maximum values may vary depending on the alloy composition.

Note) Various shapes and sizes can be made according to customer requirements.
**Chip**

**Reinforces the area where the amount of solder is insufficient**

- Unique pressing technique allows flattening of all four bonding faces of the chips
- Chip mounter makes automatic mounting possible
- Joint reinforcement of pin thru-hole components using reflow

**Wire**

**Makes low-cost, high-quality die bonding a reality**

- The wire method allows mounting at a cheaper price than the preform method
- Fewer surface scratches and oxide film deposits combined with good wettability make fluxless mounting possible
- Superb condition of the wire surface suppresses the formation of voids

**Automatic chip solder mounting simultaneously with electronic components**

**Joint reinforcement of pin thru-hole components using reflow**

**Wettability and voids**

<table>
<thead>
<tr>
<th>Surface condition of wires (SEM)</th>
<th>Wettability comparison (in reducing atmosphere)</th>
<th>Comparison of voids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less scratches, oil, grease and oxide film deposits</td>
<td>Excellent wettability</td>
<td>Suppresses the formation of voids</td>
</tr>
</tbody>
</table>

Example of die bonding:

- **Wire method**
  - Wire heating and supply
  - Solder fixing
  - Chip mounting and soldering
  - In Reduction Furnace
- **Preform method**
  - Preform supply
  - Chip mounting
  - Heating and soldering

**SMIC**

<table>
<thead>
<tr>
<th>Void percentage</th>
<th>Less than 2%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Void percentage</td>
<td>Less than 5%</td>
</tr>
</tbody>
</table>

**Conventional products**

<table>
<thead>
<tr>
<th>Void percentage</th>
<th>Less than 5%</th>
</tr>
</thead>
</table>

**ECO SOLDER PREFORM CATALOGUE**
Single Layer

Solder Alloy Composition and Shapes for Customer’s Requirements

- Consistent solder joint quality in mass production with fixed shapes and constant feed
- Allows for flux-free soldering in inert atmospheres
- Solder alloys with difficult process properties, such as those containing Bi and Sb, are available

Shape

- Consistent solder joint quality in mass production with fixed shapes and constant feed
- Allows for flux-free soldering in inert atmospheres
- Solder alloys with difficult process properties, such as those containing Bi and Sb, are available

Solder Alloy Composition and Shapes for Customer’s Requirements

Applications

- Ideal for die bonding

Ideal for die bonding where it is difficult to feed the solder and expecting to eliminate voids

Nickel Balls Contained

Ni Ball Spacing Function Improves Joint Reliability

- Ensures standoff to prevent cracking due to concentrated thermal stress
- Flat layered structure improves wire bonding accuracy
- Unique Ni ball technology eliminates causes of voids and helps maintain heat dissipation performance

Shape

- Ensures standoff to prevent cracking due to concentrated thermal stress
- Flat layered structure improves wire bonding accuracy
- Unique Ni ball technology eliminates causes of voids and helps maintain heat dissipation performance

Structure

The standard ECO SOLDER Preform is the Single Layer type. Selecting proper solder alloy composition according to expected physical properties and processed into target shapes for use in various mounting methods. In addition, the product is processed with high dimensional accuracy, which contributes to mass production stability.

Applications

- High-quality power modules

High-quality power modules

- Bare chip
- Power module
- Heat sink B
- Power semiconductor mounting using preform with Ni balls
- Automotive DC/AC converter

Performance / Lineup

- Effect of pellets containing Ni balls

Effect of pellets containing Ni balls

- Ni balls suppress variations in solder thickness

Without Ni balls
- With Ni balls

Solder thickness at each measured location
Flux Cored

Synergistic Effect of Resin Flux Cored Solder and Preform

- Fixed shapes and constant feed while ensuring the latest flux cored solder performance
- Ideal for thru-hole mounting of connectors, discrete and metal components
- Reduces production costs by switching from local flow soldering

Flux Coated

Excellent Joints Even on Uneven Surfaces

- Flux application is not necessary
- Allows the paste to be applied to hard-to-apply uneven surfaces
- Void formation is less and heat dissipation properties are excellent

Structure

Flux Cored products have flux built into the preform. In addition to eliminating the flux application process, storage and handling are also easier due to the solid stability. Except for special applications, customers have a choice to select the alloy and flux function according to the requirements from the lineup of flux cored solders.

Applications

- Assembling metal components
- Local heat mounting of heat-sensitive components
- Thru-hole reflow soldering of inserted components

Performance / Lineup

Please refer to our ECO SOLDER CORED product catalogue. Contact us for more information about other products.

Flux Coated

Excellent Joints Even on Uneven Surfaces

Structure

The exterior of the Flux Coated general-purpose preforms is evenly dry-coated with flux, eliminating the need of manual fluxing.

Applications

- Select coating flux according to the purpose

Flux residue can be removed with a commercially available flux cleaner.

<table>
<thead>
<tr>
<th>Flux</th>
<th>Type</th>
<th>IPC classification</th>
<th>Applicable base material</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFC1</td>
<td>R</td>
<td>ROL0</td>
<td>Ni/Au plating, Ag, Cu, etc.</td>
</tr>
<tr>
<td>SFC2</td>
<td>Halogen free</td>
<td>ROL0</td>
<td>Ni/Au plating, Ag, Cu, etc.</td>
</tr>
<tr>
<td>SFC3</td>
<td>RMA</td>
<td>ROL1</td>
<td>Ni/Au plating, Ag, Cu, etc.</td>
</tr>
<tr>
<td>SFC4</td>
<td>RA</td>
<td>ROL1</td>
<td>Ni, brass, Cu, Sn, etc.</td>
</tr>
<tr>
<td>SFC5</td>
<td>RA</td>
<td>ROM1</td>
<td>Ni, brass, Cu, Sn, etc.</td>
</tr>
</tbody>
</table>
Solder Coated Metal

Applying the Shapes, Dimensions, and Properties of Base Metal to Soldering

- Thick solder coating protects the base metal surface and ensures the solder feed
- Base metal ensures the soldering standoff and improves its reliability
- Molding technology enables supplying a variety of shapes

Structure

Solder Coated Metal can be used as composite solder joining components by forming a solder alloy layer on the surface of ferrous and non-ferrous base metals through a melt coating process and shaping it according to the purpose.

Applications

- Component for hermetically sealed devices

Performance

- Ensures standoff and adds joint characteristics
- Uniformity of the solder coating layer
- Maintains peel resistance

Base metal can be used as a spacer

Melted solder coating layer does not peel (JIS K6600: Crosscut method)

Multi Layers

Integrating Materials with Different Properties to Develop New Joint Processing

- Solder alloys with different properties are laminated
- Two-step soldering utilizing different melting temperatures
- Optimal joint for electrodes with different surface materials

Structure

Preform of Multi Layers is a multifunctional product where two or more solder alloys with different properties are roll clad.

Enables two-step joints by temperature and optimum composition solder joints with different materials and treatments by utilizing the difference in temperatures and mechanical properties.

Applications

- Joining with optimum solder composition for bonding surface conditions
- Surface treatment for identifying the composition of the surface
- Cutoff fuses for temperature sensors

Alloys with different compositions and melting temperatures are made into a bimetal structure

Note) All products are tailor made. Please contact us when considering these products.
### Solder Alloy Lineup

<table>
<thead>
<tr>
<th>Alloy name</th>
<th>Alloy composition(wt%)</th>
<th>Melting temperature range(℃)</th>
<th>Structure of products</th>
</tr>
</thead>
<tbody>
<tr>
<td>M705</td>
<td>Sn-3.0Ag-0.5Cu</td>
<td>217~220</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>M30</td>
<td>Sn-3.5Ag</td>
<td>221~223</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>M31</td>
<td>Sn-3.5Ag-0.75Cu</td>
<td>217~219</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>M34</td>
<td>Sn-1.0Ag-0.5Cu</td>
<td>217~227</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>M20</td>
<td>Sn-0.75Cu</td>
<td>227~229</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>M40</td>
<td>Sn-1.0Ag-0.7Cu-Bi-In</td>
<td>211~222</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>M10</td>
<td>Sn-5.0Sb</td>
<td>245~243</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>M14</td>
<td>Sn-10Ag</td>
<td>245~246</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>M794</td>
<td>Sn-3.4Ag-0.7Cu-Bi-Sb-Ni-x</td>
<td>215~221</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>M725</td>
<td>Sn-0.7Cu-Ni-P</td>
<td>228~230</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>M731</td>
<td>Sn-3.5Ag-0.4Cu-3.5Sb</td>
<td>221~226</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>M716</td>
<td>Sn-3.5Ag-0.6Bi-0.6Sn</td>
<td>196~214</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>L20</td>
<td>Sn-58Bi</td>
<td>139~141</td>
<td>● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
</tbody>
</table>

Please contact us for more information about other alloy composition.

- **M705**: 3% Ag general-purpose alloy with more than 20 years of experience
- **M794**: Heat & fatigue-resistant alloy for automotive applications
- **M731**: Heat & fatigue-resistant general-purpose alloy for automotive applications
- **M20**: Ag-free, Cu based general-purpose alloy
- **M10**: Sb based general-purpose alloy with a high melting point
- **L20**: Bi based general-purpose alloy with a low melting point

### Base Material Physical Properties for Solder Coated Metal

<table>
<thead>
<tr>
<th>Metal Base material</th>
<th>Metal No.</th>
<th>Melting temperature, JIS (℃)</th>
<th>Composition</th>
<th>Tensile strength, JIS (N/mm²)</th>
<th>Elongation (%)</th>
<th>Vickers hardness, JIS (HV)</th>
<th>Young’s modulus, JIS (GPa)</th>
<th>Coefficient of thermal expansion, JIS (10⁻⁶/K)</th>
<th>Specific gravity, JIS (g/cm³)</th>
<th>Electrical conductivity, JIS (%)</th>
<th>Thermal conductivity, JIS (W/m/K)</th>
<th>Specific heat capacity, JIS (J/g/K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C7701</td>
<td>C7701</td>
<td>05</td>
<td>Zn-63Cu-18Ni</td>
<td>440-550</td>
<td>5</td>
<td>110-180</td>
<td>125</td>
<td>16.7(30-300℃)</td>
<td>8.70</td>
<td>5.5</td>
<td>29</td>
<td>0.377</td>
</tr>
<tr>
<td>C7010</td>
<td>C7701</td>
<td>05</td>
<td>Zn-63Cu-16Ni</td>
<td>420-450</td>
<td>4</td>
<td>180-240</td>
<td>125</td>
<td>16.7(30-300℃)</td>
<td>8.70</td>
<td>5.5</td>
<td>29</td>
<td>0.377</td>
</tr>
<tr>
<td>C1100</td>
<td>C7701</td>
<td>05</td>
<td>Cu99.90%</td>
<td>275</td>
<td>2-15</td>
<td>80</td>
<td>110-125</td>
<td>17.0(20-100℃)</td>
<td>17.7(20-200℃)</td>
<td>8.54</td>
<td>101</td>
<td>349</td>
</tr>
</tbody>
</table>

The above values are for reference only. Please contact us about materials not listed above.

- **M705**: 3% Ag general-purpose alloy with more than 20 years of experience
- **M794**: Heat & fatigue-resistant alloy for automotive applications
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- **M20**: Ag-free, Cu based general-purpose alloy
- **M10**: Sb based general-purpose alloy with a high melting point
- **L20**: Bi based general-purpose alloy with a low melting point

### Realization of fixed shape & constant supply by low-temperature, Bi-based solder preform

**Typical composition**

**L20** (Sn-58Bi)  
139~141℃

Improving mass production stability for low-temperature mountings and effective for solder feeding methods to which solder pastes are difficult to apply.

- **Saving energy**
- **Applicable to heat-sensitive components**
- **Reducing high heat-resistant components**
- **Enhance productivity**

### High-strength, Sb-based solder composition preforms allow for secure mounting of electronic power devices

**Typical composition**

**M14** (Sn-10Sb)  
245~266℃

Constant feeding of high-strength solder ensures reliable mounting that can withstand severe environments such as those in automotive, industrial, and aerospace equipment.