

SMIC

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Attention to counterfeit products.
Counterfeit flux cored and other inauthentic SMIC solder products have been distributed abroad.
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975F-E011901K

SMIC



SMIC Lead-Free Solder Preforms Catalogue

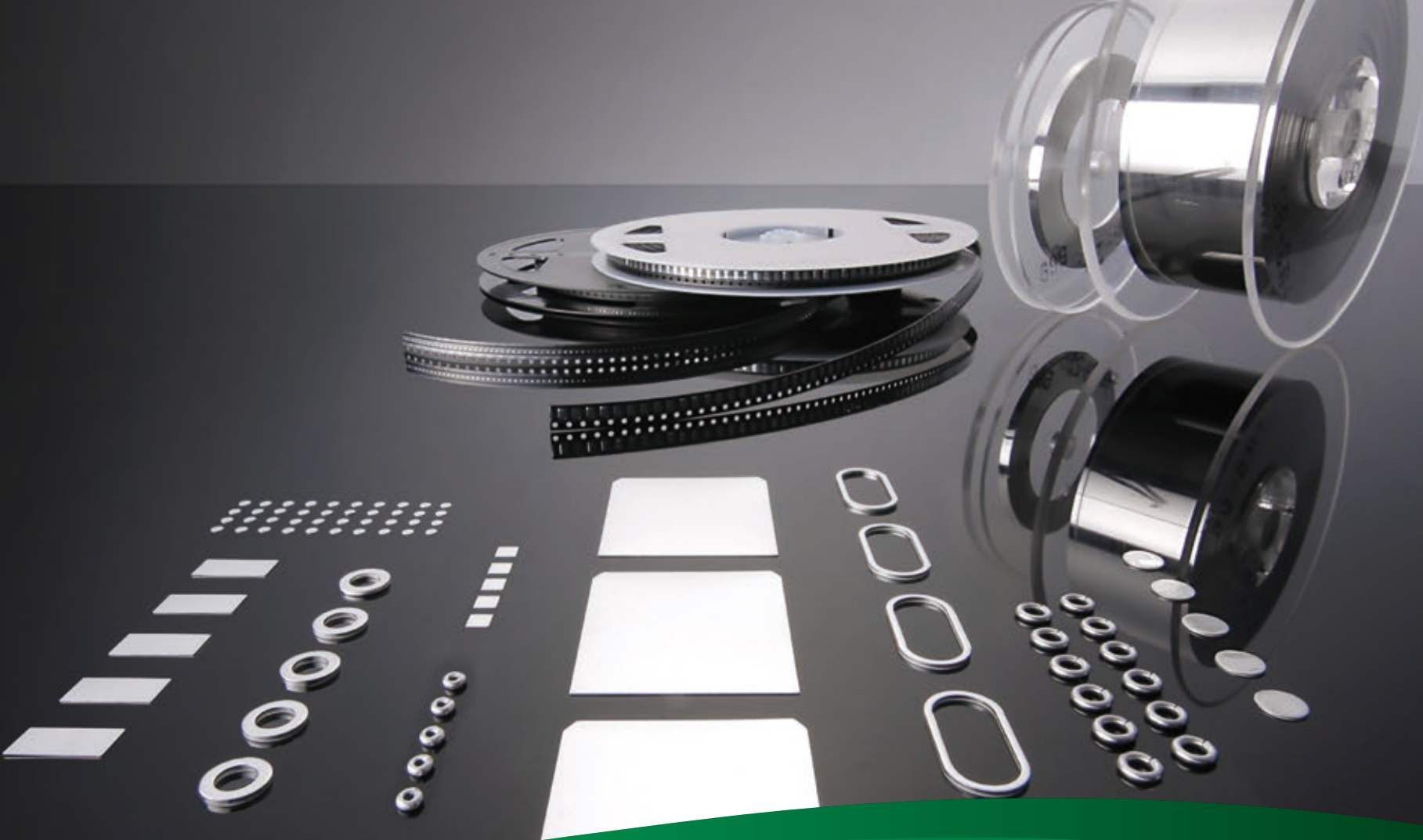
ECO SOLDER PREFORM

ECO SOLDER PREFORM

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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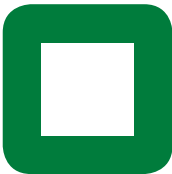
Line up

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

Shape



Ribbon



Square



Disc



Washer



Ring



Chip



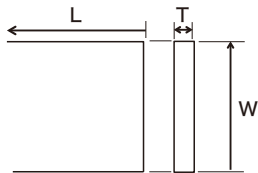
Wire

Variety of standard shapes including square, washer and disc. Custom shapes and dimensions are available for customer requirements.

Structure	Shape							Packaging		
								Reel	Container	Tape & Reel
Single Layer 	●	●	●	●		●	●	●	●	●
Nickel Balls Contained 	●	●	●	●				●	●	●
Flux Cored 	●	●	●	●	●			●	●	
Flux Coated 		●								●
Solder Coated Metal 	●	●	●	●				●	●	
Multi Layers 	●	●	●	●				●	●	●

Shape

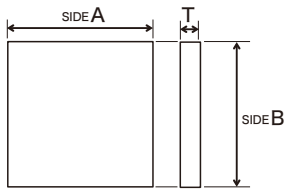
Ribbon



W Width
Min = 0.5 mm (0.020 in.)
Max = 70 mm (2.756 in.)
T Thickness
Min = 0.05 mm (0.002 in.)
Max = 0.35 mm (0.014 in.)

L Length
Please ask about this specification.

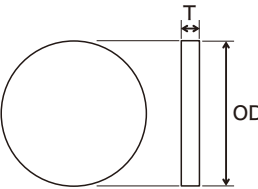
Square



SIDE A
Min = 0.5 mm (0.020 in.)
Max = 100 mm (3.937 in.)
SIDE B
Min = 0.5 mm (0.020 in.)
Max = 70 mm (2.756 in.)

T Thickness
Min = 0.05 mm (0.002 in.)
Max = 2.5 mm (0.098 in.)

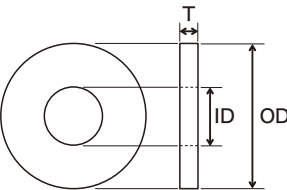
Disc



OD Outer Diameter
Min = 0.3 mm (0.012 in.)
Max = 62 mm (2.441 in.)

T Thickness
Min = 0.05 mm (0.002 in.)
Max = 2.5 mm (0.098 in.)

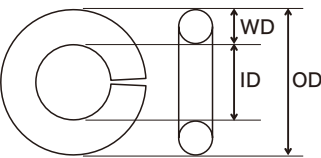
Washer



OD Outer Diameter
Min = 1.2 mm (0.047 in.)
Max = 40 mm (1.575 in.)
ID Inner Diameter
Min = 0.6 mm (0.024 in.)
Max = 35 mm (1.378 in.)

W Width
Min = 0.05 mm (0.002 in.)
Max = 2.5 mm (0.098 in.)
•Processing condition : (OD-ID)÷2 ≥ T

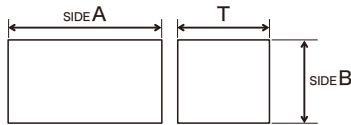
Ring



OD Outer Diameter
Min = 1 mm (0.039 in.)
Max = 19 mm (0.748 in.)
ID Inner Diameter
Min = 0.4 mm (0.016 in.)
Max = 15 mm (0.591 in.)

WD Wire Diameter
Min = 0.3 mm (0.012 in.)
Max = 2 mm (0.079 in.)
•Processing condition : ID ≥ WD
•WD (mm) : 0.3,0.4,0.5,0.6,0.65,0.8,1.0,1.2,1.6,2.0

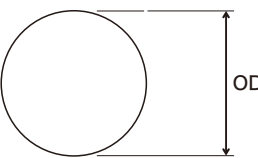
Chip



SIDE A
Min = 0.6 mm (0.024 in.)
Max = 3.2 mm (0.126 in.)
SIDE B
Min = 0.3 mm (0.012 in.)
Max = 1.6 mm (0.063 in.)

T Thickness
Min = 0.3 mm (0.012 in.)
Max = 1.6 mm (0.063 in.)

Wire



OD Outer Diameter
Min = 0.3 mm (0.012 in.)
Max = 1 mm (0.039 in.)

L Length
Please ask about this specification.



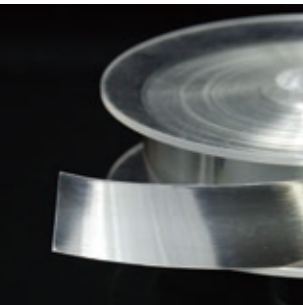
Other Shapes

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

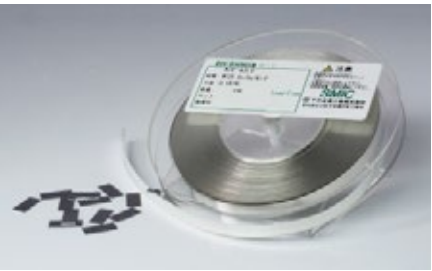
Minimum and maximum values may vary depending on the alloy composition.

Mounting method for each shape

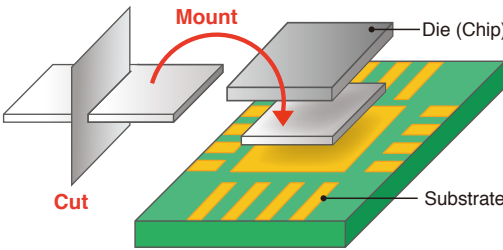
Ribbon



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



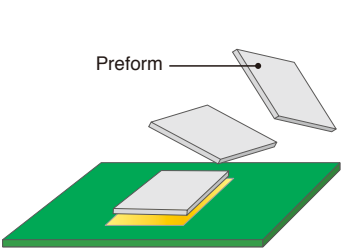
Reel winding for easy automated cutting



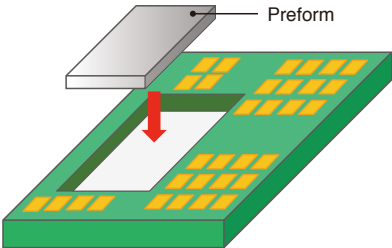
Square



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



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

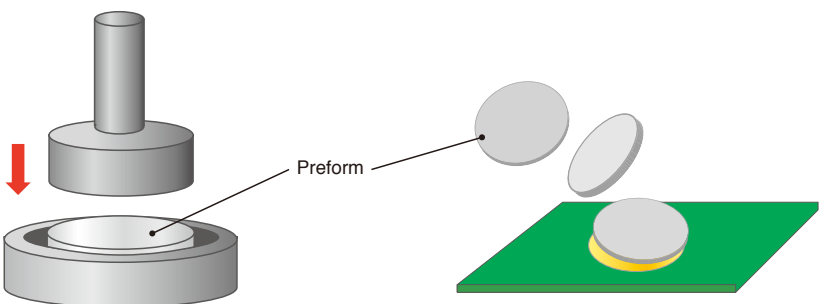


Feeding to where it's difficult to supply solder paste and flux cored solder.

Disc



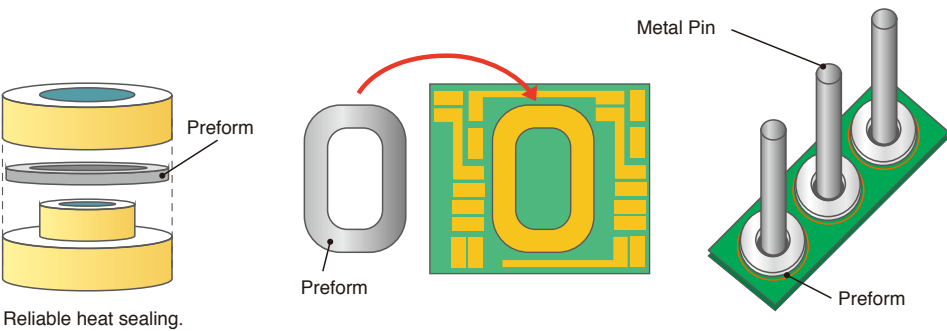
Supplying preform material fit to the soldering pads



Washer



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.

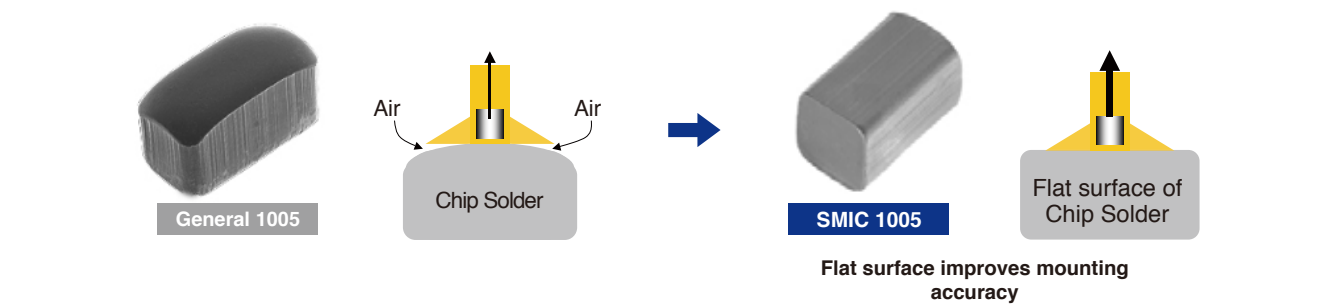
Chip

Reinforces the area where the amount of solder is insufficient

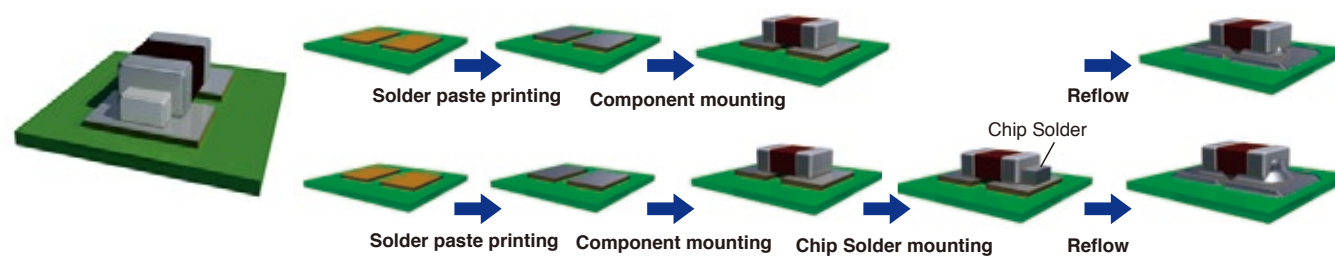
- Unique pressing technique allows flattening of all four bonding faces of the chips
- Chip moulder makes automatic mounting possible
- Joint reinforcement of pin thru-hole components using reflow



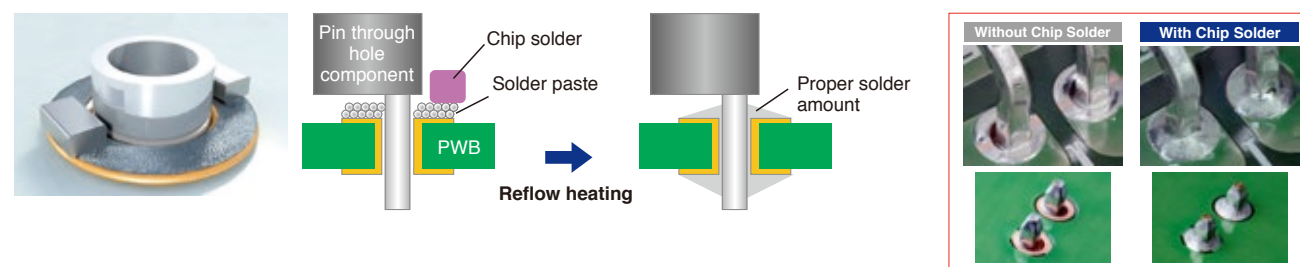
- Unique pressing technique allows flattening of all four bonding faces of the chips



- Automatic chip solder mounting simultaneously with electronic components



- Joint reinforcement of pin thru-hole components using reflow



Wire

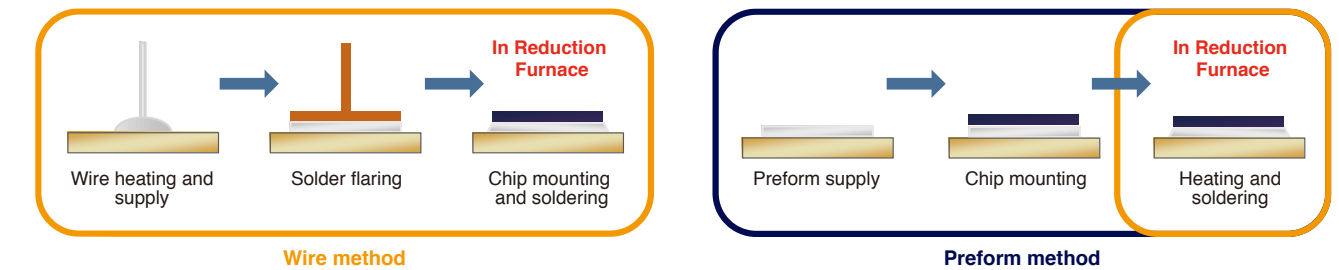
Makes low-cost, high-quality die bonding a reality

- 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



- The wire method is a cheaper way of die bonding than the preform method

Example of die bonding



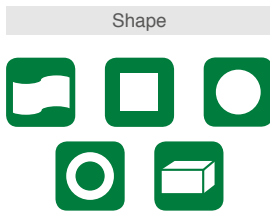
- Wettability and voids

	Surface condition of wires (SEM)	Wettability comparison (in reducing atmosphere)	Comparison of voids
SMIC products	 Less scratches, oil, grease and oxide film deposits	 Excellent wettability	 Void percentage: Less than 2% Suppresses the formation of voids
Conventional products	 Less scratches, oil, grease and oxide film deposits	 Excellent wettability	 Void percentage: Less than 5%

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



Structure

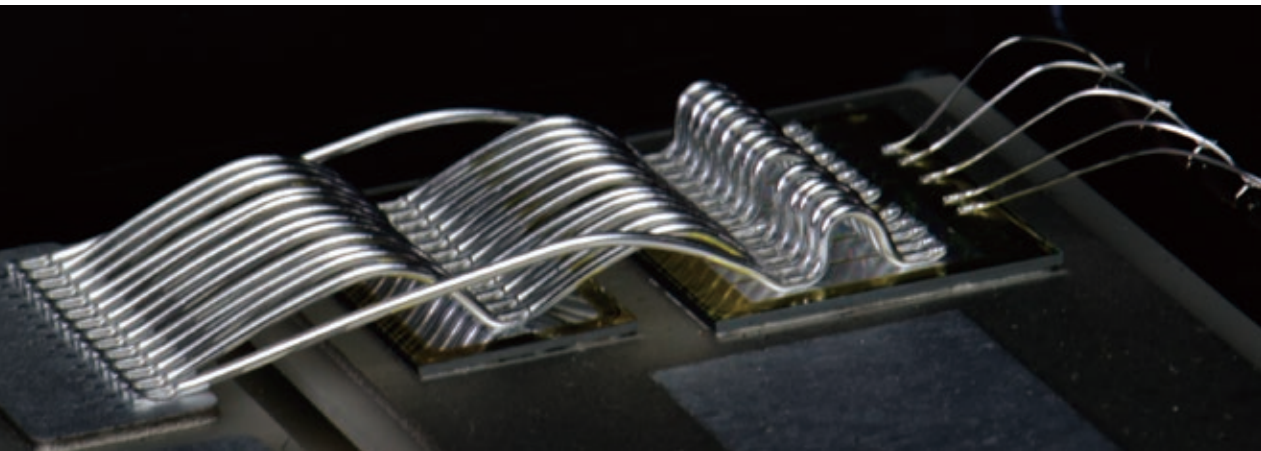
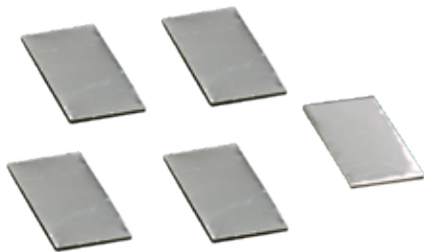


The standard ECO SOLDER Preform is the *Single Layer* type. Selecting proper solder alloy composition according to expected physical properties and processed into target shapes for use in various mounting methods. In addition, the product is processed with high dimensional accuracy, which contributes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

Applications

● Ideal for die bonding

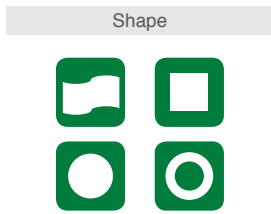
Ideal for die bonding where it is difficult to feed the solder and expecting to eliminate voids



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



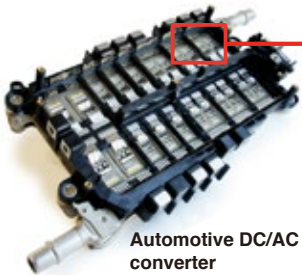
Structure



Nickel Balls Contained preform has nickel balls with a small particle size inside the preform. When soldering, it forms a standoff with the particle size of the Ni balls as the minimum to ensure the evenness of the soldering components.

Applications

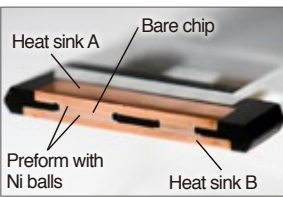
● High-quality power modules



Automotive DC/AC converter



Power semiconductor mounting using preform with Ni balls



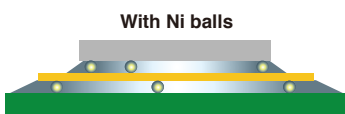
Power module

Performance / Lineup

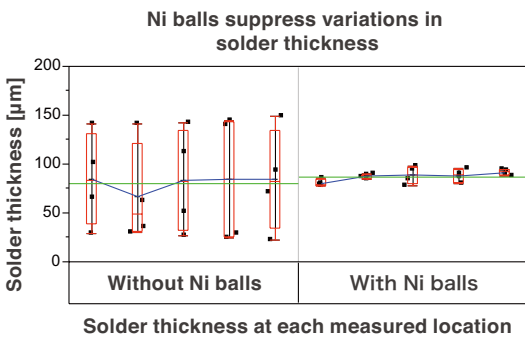
● Effect of pellets containing Ni balls



Without Ni balls



With Ni balls

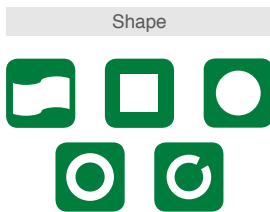


Flux Cored



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



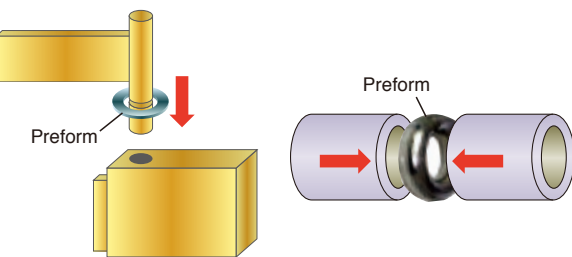
Structure



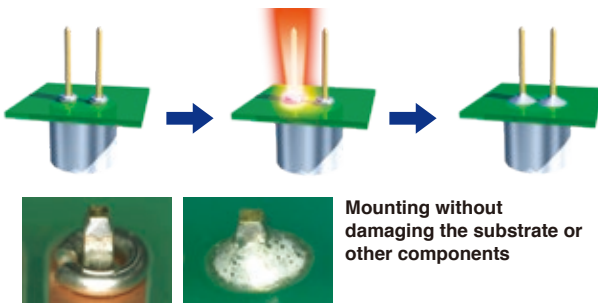
Flux Cored products have flux built into the preform. In addition to eliminating the flux application process, storage and handling are also easier due to the solid stability. Except for special applications, customers have a choice to select the alloy and flux function according to the requirements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

Applications

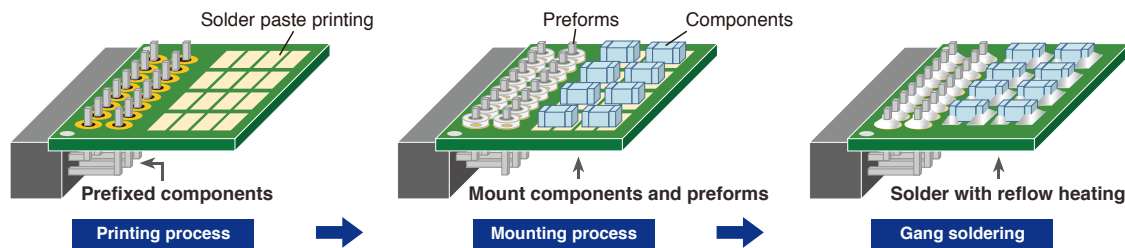
Assembling metal components



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.

Cross-section of flux cored solder preform

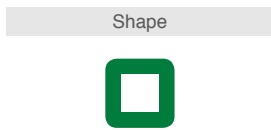


Flux Coated



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

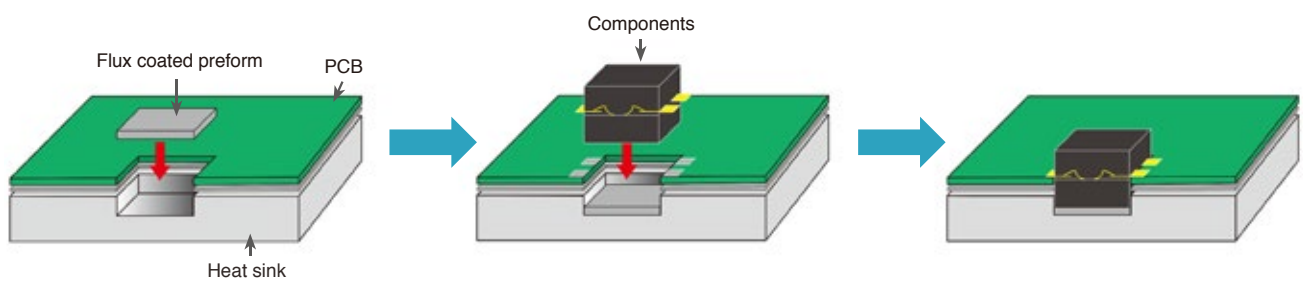


Structure



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

Applications

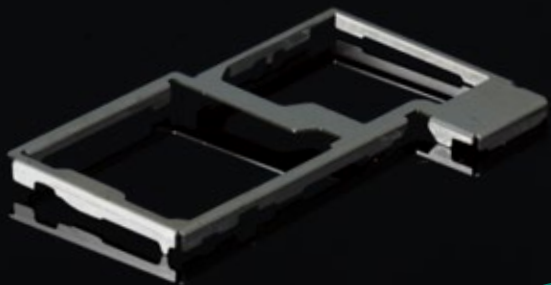


Select coating flux according to the purpose

Flux	Type	IPC classification	Applicable base material
SFC1	R	ROL0	Ni/Au plating, Ag, Cu, etc.
SFC2	Halogen free	ROL0	Ni/Au plating, Ag, Cu, etc.
SFC3	RMA	ROL1	Ni/Au plating, Ag, Cu, etc.
SFC4	RA	ROL1	Ni, brass, Cu, Sn, etc.
SFC5	RA	ROM1	Ni, brass, Cu, Sn, etc.

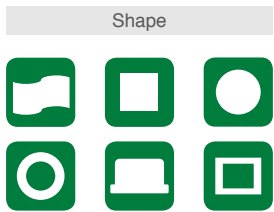
Colored types are also available.
Please contact us about available flux types.
Flux residue can be removed with a commercially available flux cleaner.

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



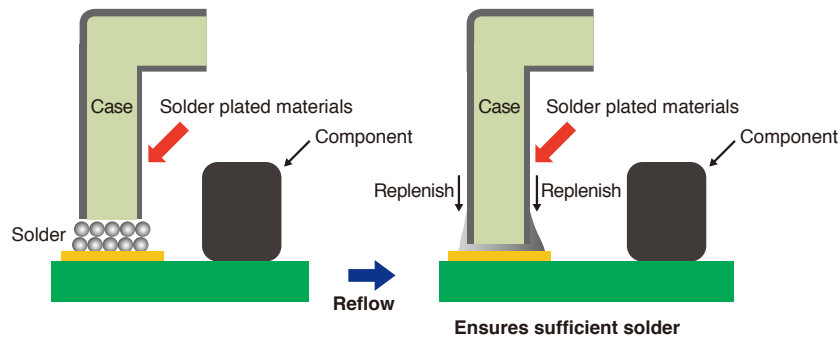
Structure



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.

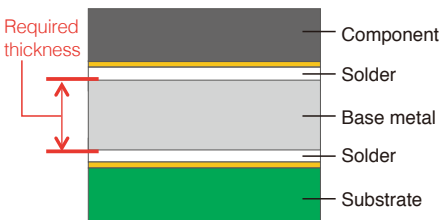
Applications

- Component for hermetically sealed devices



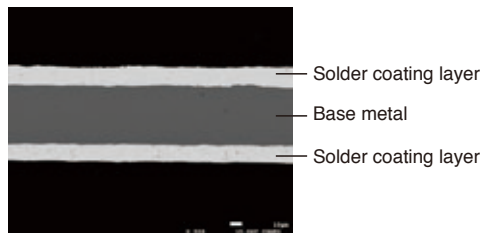
Performance

- Ensures standoff and adds joint characteristics



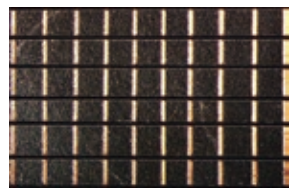
Base metal can be used as a spacer

- Uniformity of the solder coating layer



Forms 10 to 25 μm solder coating thickness

- Maintains peel resistance



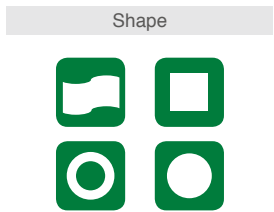
Molten solder coating layer does not peel (JIS K5600: Crosscut method)

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



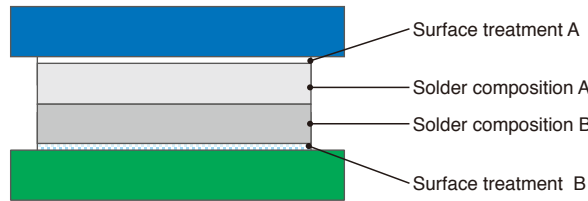
Structure



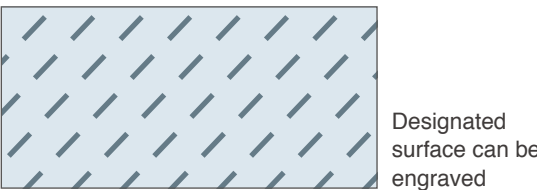
Preform of *Multi Layers* is a multifunctional product where two or more solder alloys with different properties are roll clad. Enables two-step joints by temperature and optimum composition solder joints with different materials and treatments by utilizing the difference in temperatures and mechanical properties.

Applications

- Joining with optimum solder composition for bonding surface conditions

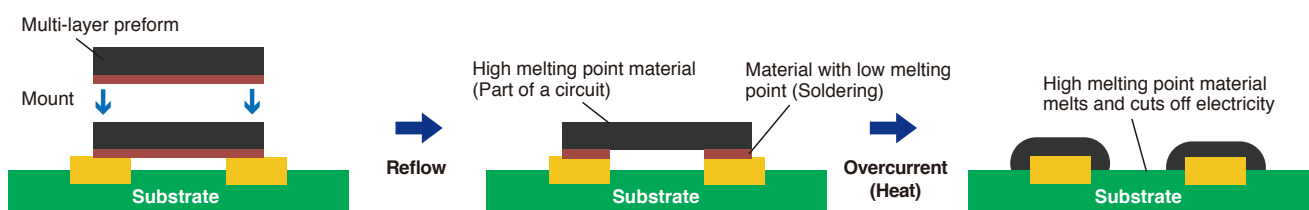
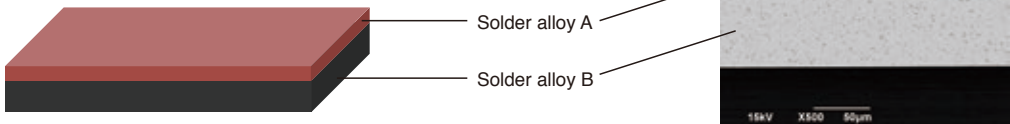


- Surface treatment for identifying the composition of the surface



- 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

Alloy name	Alloy composition(wt%)	Melting temperature range °C	Structure of products					
								
M705	Sn-3.0Ag-0.5Cu	217 – 220	●	●	●	●	●	●
M30	Sn-3.5Ag	221 – 223	●	●	●		●	●
M31	Sn-3.5Ag-0.75Cu	217 – 219	●	●	●		●	●
M34	Sn-1.0Ag-0.5Cu	217 – 227	●	●	●		●	●
M20	Sn-0.75Cu	227 – 229	●	●	●		●	●
M40	Sn-1.0Ag-0.7Cu-Bi-In	211 – 222	●	●			●	●
M10	Sn-5.0Sb	240 – 243	●	●	●		●	●
M14	Sn-10Sb	245 – 266	●	●	●		●	●
M794	Sn-3.4Ag-0.7Cu-Bi-Sb-Ni-x	210 – 221	●				●	●
M725	Sn-0.7Cu-Ni-P	228 – 230	●	●			●	●
M731	Sn-3.9Ag-0.6Cu-3.0Sb	221 – 226	●	●	●		●	●
M716	Sn-3.5Ag-0.5Bi-8.0In	196 – 214	●	●	●		●	●
L20	Sn-58Bi	139 – 141	●				●	

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

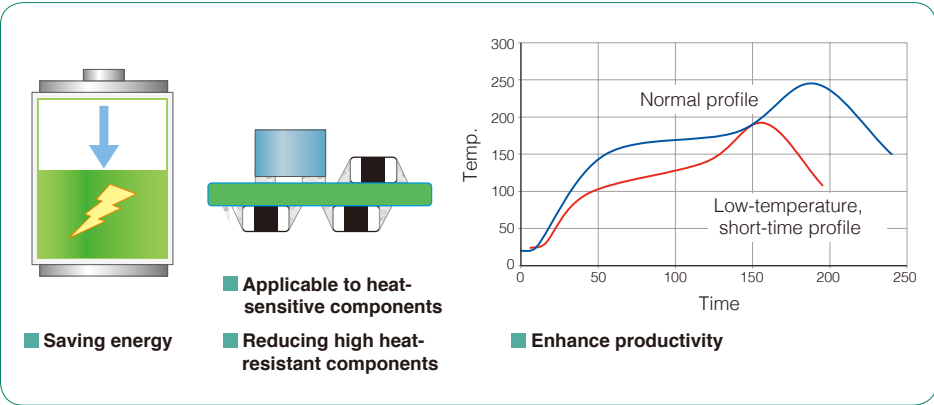


Realization of *fixed shape & constant supply* by low-temperature, Bi-based solder preform

Typical composition

L20
(Sn-58Bi)
139~141°C

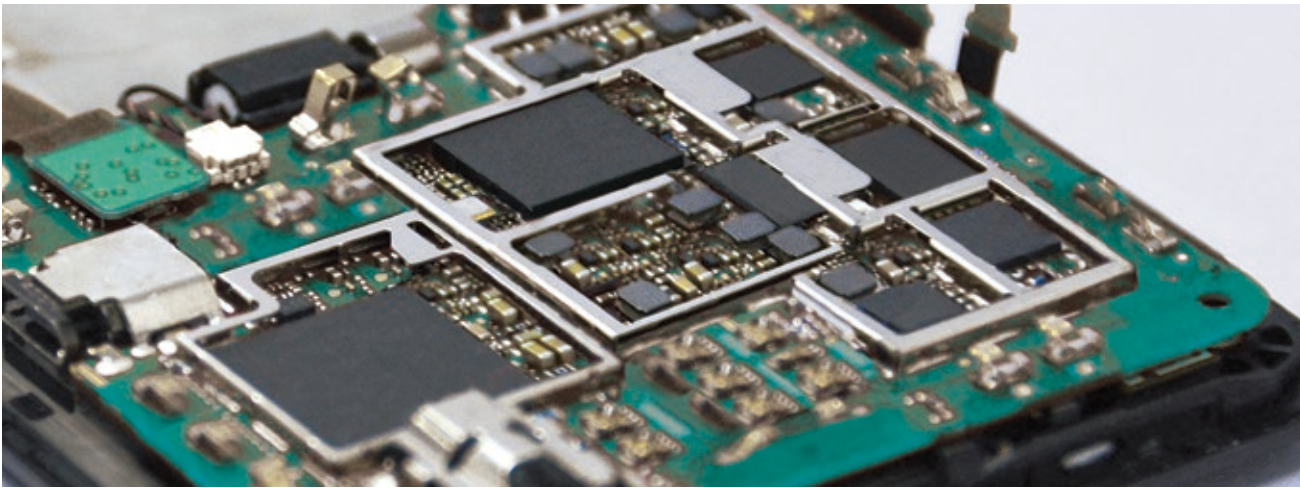
Improving mass production stability for low-temperature mountings and effective for solder feeding methods to which solder pastes are difficult to apply.



Base Material Physical Properties for Solder Coated Metal

Metal base material	Metal No.		Melting temperature (°C) [(°F)]	Composition	Tensile strength (N/mm²)	Elongation (%)	Vickers hardness (Hv)	Young's module (GPa)	Coefficient of thermal expansion (10 ⁻⁶ /K)	Specific gravity (g/cm³)	Electrical conductivity (%IACS)	Thermal conductivity (20°C) (W/m/K)	Specific heat (J/g/K)
	JIS	Classification											
Nickel silver	C7521	O	1110 [2030]	Zn-63Cu-18Ni	≥375	≥20	-	125	16.2(30-300°C)	8.73	6	33	0.377
		1/2H	1110 [2030]	Zn-63Cu-18Ni	440-570	≥5	120-180	125	16.2(30-300°C)	8.73	6	33	0.377
		H	1110 [2030]	Zn-63Cu-18Ni	≥540	≥3	≥150	125	16.2(30-300°C)	8.73	6	33	0.377
	C7701	H	1055 [1931]	Zn-56Cu-18Ni	630-735	≥4	180-240	125	16.7(30-300°C)	8.70	5.5	29	0.377
Copper	C1020	H	1083 [1981]	≥Cu99.96%	≥275	2-15	≥80	110-128	17.0(20-100°C) 17.7(20-200°C)	8.94	101	349	0.38
	C1100	H	1083 [1981]	≥Cu99.90%	≥275	2-15	≥80	110-128	17.0(20-100°C) 17.7(20-200°C)	8.89-8.94	101	349	0.38

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



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

Typical composition

M14
(Sn-10Sb)
245~266°C

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

