SMIC

Contact

SENJU METAL INDUSTRY CO., LTD.

HEADQUARTERS
Senju Hashido-cho 23, Adachi-ku, Tokyo 120-8555, Japan
Phone +81-3-3888-5151
URL www.senju.com/en

Attention to counterfeit products.
Counterfeit flux cored and other inauthentic SMIC solder products have been distributed abroad.
Please purchase genuine SMIC products from SMIC subsidiaries or authaorized distributors.

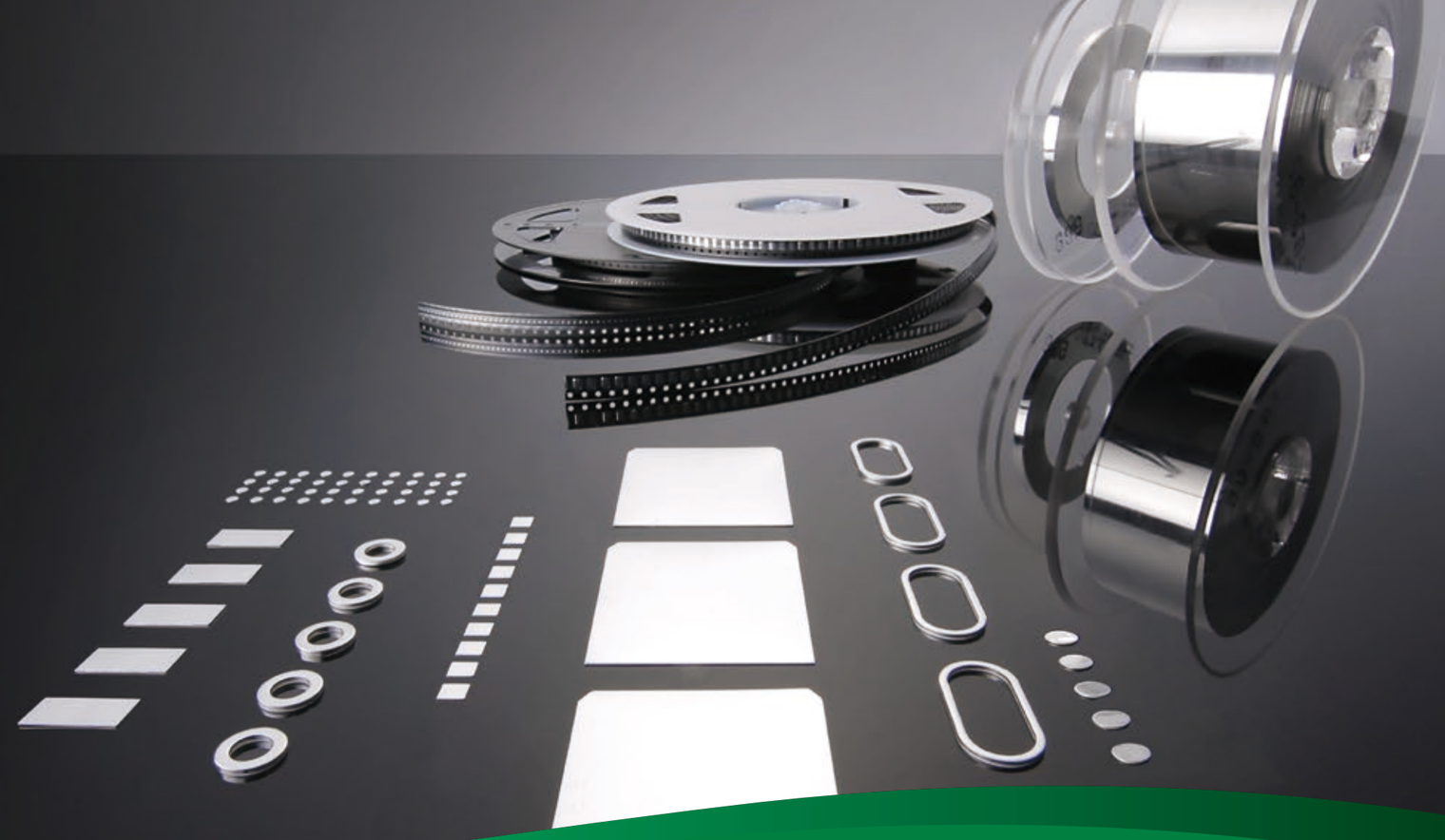
975H-E042001K

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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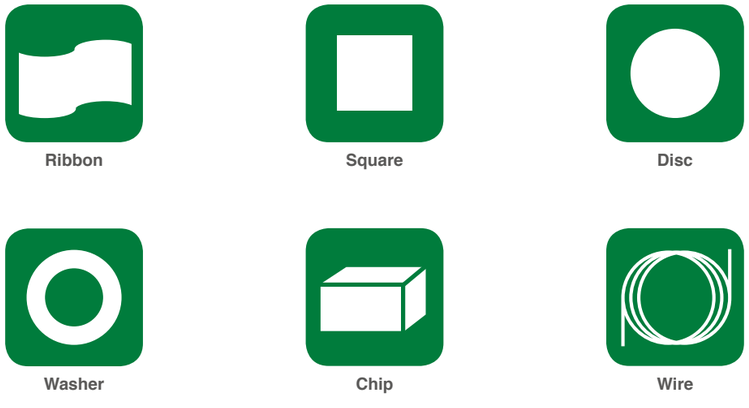
Line up

Promote various synergies by selecting from 6 shapes as well as from solder alloy composition and dimensions.

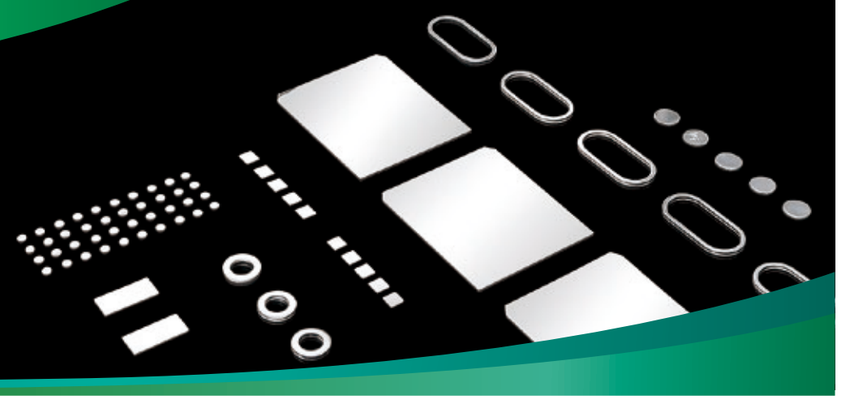
Shape



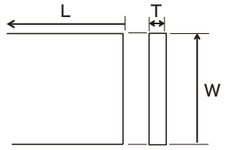
Custom shapes and dimensions are available for customer requirements.

Structure	Shape						Packaging		
							Reel	Container	Tape & Reel
Single Layered	●	●	●	●	●	●	●	●	●
Ni Balls Contained	●	●	●	●			●	●	●
Flux Cored	●	●	●	●			●	●	
Flux Coated		●							●
Solder Coated Metal	●	●	●	●			●	●	
Double Layered	●	●	●	●			●	●	●

Shape



Ribbon

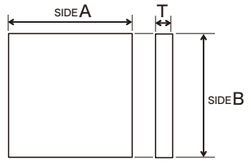


W Width
Min = 0.5 mm (0.020 in.)
Max = 70 mm (2.756 in.)

T Thickness
Min = 0.05 mm (0.002 in.)
Max = 0.35 mm (0.014 in.)

L Length
Please ask about this specification.

Square

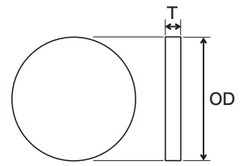


SIDE A
Min = 0.5 mm (0.020 in.)
Max = 100 mm (3.937 in.)

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.)

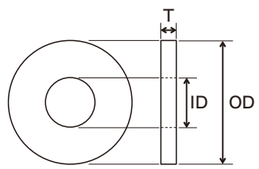
Disc



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



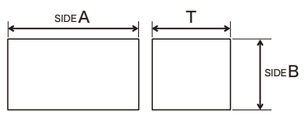
OD Outer Diameter
Min = 1.2 mm (0.047 in.)
Max = 40 mm (1.575 in.)

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

Chip

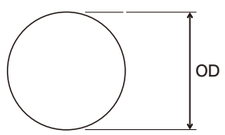


SIDE A
Min = 0.6 mm (0.024 in.)
Max = 3.2 mm (0.126 in.)

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

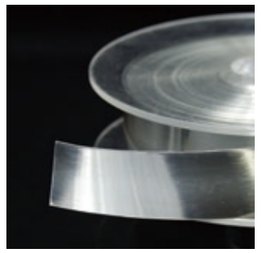
To make other shape, customers' design drawings and specifications will be required.
Please contact us for more details.

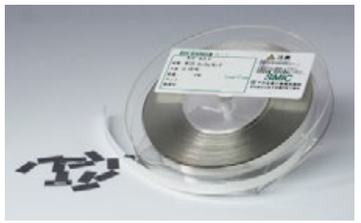
Minimum and maximum values may vary depending on the alloy composition.

Soldering methods for each shape

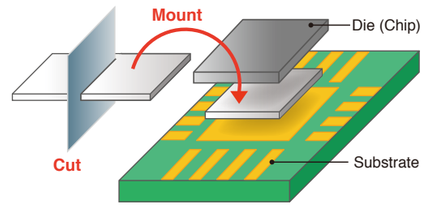
Ribbon

Wound in tape reels and can be cut into required lengths prior to mounting.



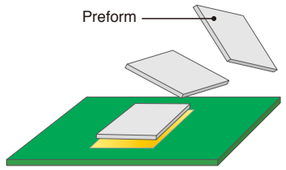


Reel winding for easy automated cutting

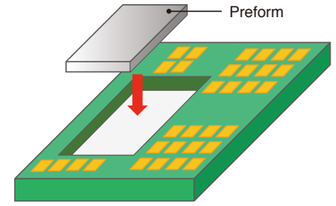


Square

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



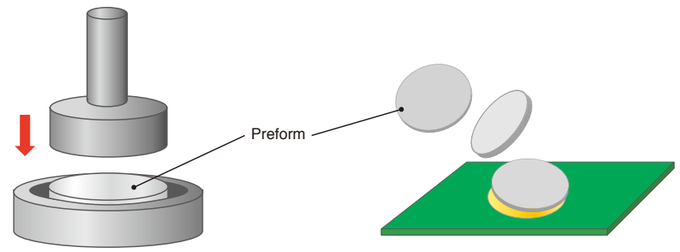
Enables identification by matching the pad shapes of substrates and components.



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

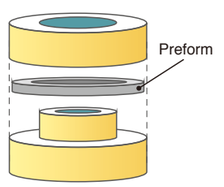
Disc

Processed into shapes to fit the components.

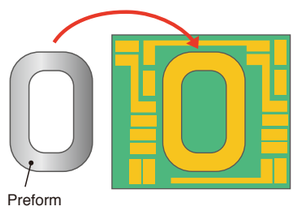


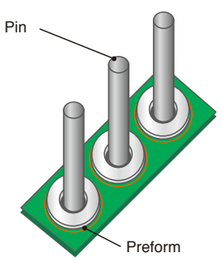
Washer

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



Reliable heat sealing.





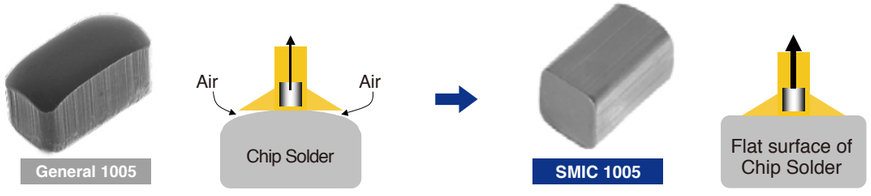
Note) Various shapes and sizes can be made according to customer requirements.

Chip

Reinforces the area where the amount of solder is insufficient

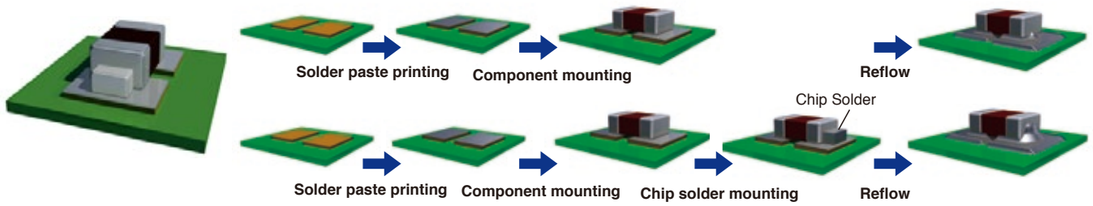
- Unique pressing technique flattening all four bonding faces of the chips
- Automatic mounting possible with chip mounter
- Joint reinforcement of pin thru-hole components using reflow

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

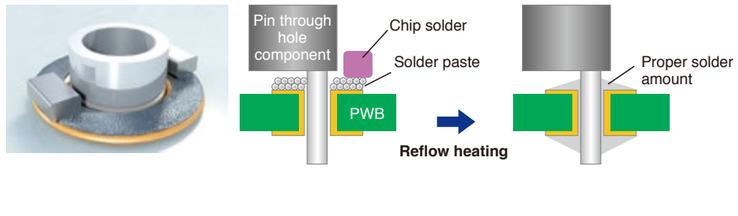


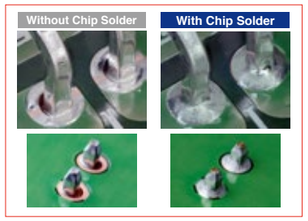
Flat surface improves mounting accuracy

Automatic mounting possible with chip mounter



Joint reinforcement of pin thru-hole components using reflow





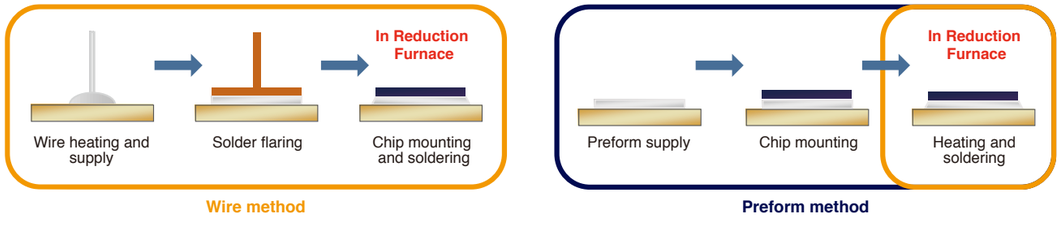
Wire

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

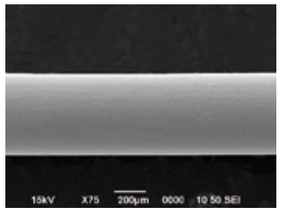
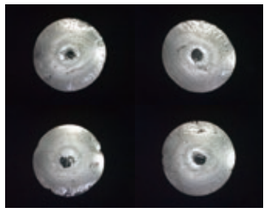
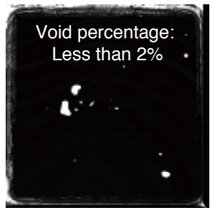
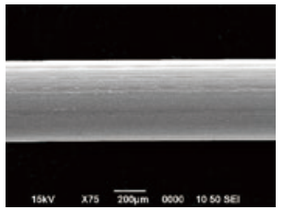
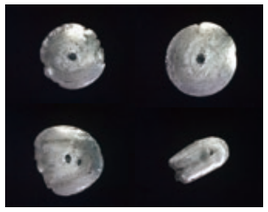
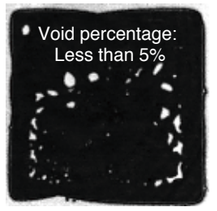
- The wire method allowing soldering at a cheaper price than the preform method
- Fewer surface scratches and oxide film combined with good wettability making flux-free soldering possible
- Superb condition of the wire surface suppressing the formation of voids

The wire method allowing soldering at a cheaper price than the preform method

Example of die bonding



Wettability and voids

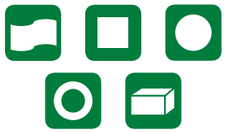
	Surface condition of wires (SEM)	Wettability comparison (in reducing atmosphere)	Comparison of voids
SMIC products	 Less scratches, oil, grease and oxide film deposits	 Excellent wettability	 Void percentage: Less than 2% Suppresses the formation of voids
On-market products			 Void percentage: Less than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

Single Layered

Solder Alloy Composition and Shapes for Customer's Requirements

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

Shape



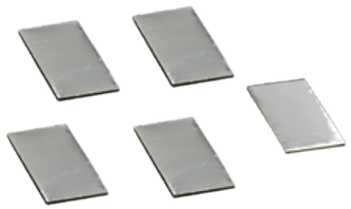
Structure

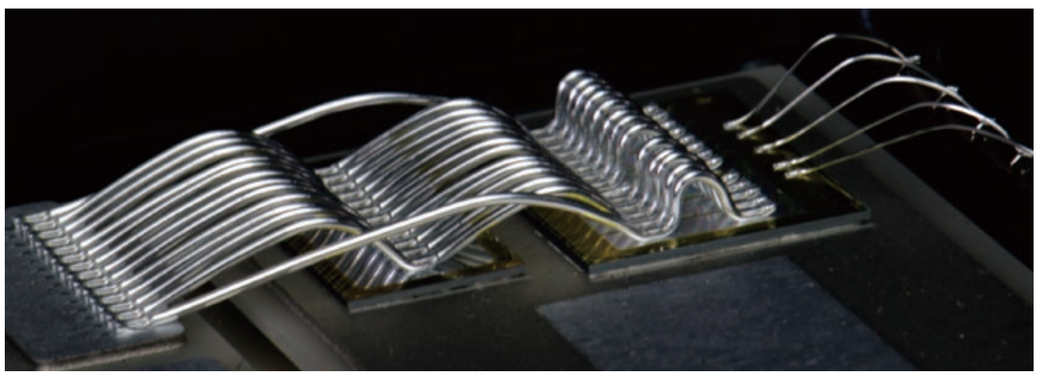
Single Layered preform is the standard type of ECO SOLDER PREFORM. Can be applied in various soldering methods by selecting proper solder alloy composition depending on requirements and processing into proper shapes. In addition, the product is processed with high dimensional accuracy, which contributes 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.





Ni Balls Contained

Ni Ball Spacer Function Improves Joint Reliability

- Ensures standoff to prevent cracking due to concentrated thermal stress.
- Flat layered structure improves wire bonding accuracy.

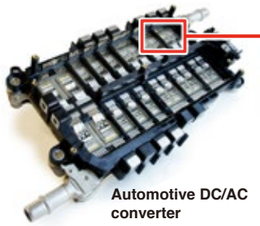
Shape

Structure

Ni 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.

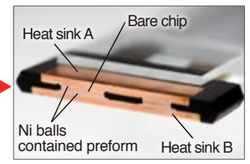
Applications

High-quality power modules



Automotive DC/AC converter

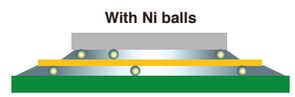
Power semiconductor soldering using Ni balls contained preform

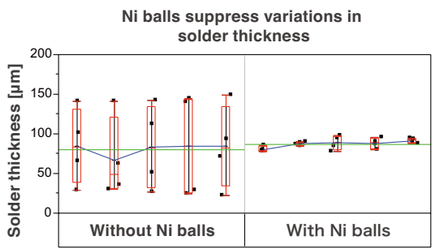


Power module

Performance / Lineup

Spacer function of Ni balls





Solder thickness at each measured location

Flux Cored

Synergistic Effect of Preform and Flux

- Fixed shapes and quantity while adding the functions of flux.
- Ideal for thru-hole soldering of connectors, discrete and metal components.
- Reduces production costs by switching from selective flow soldering.

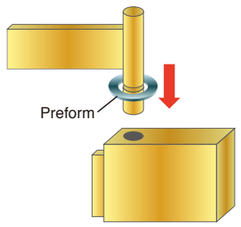
Shape

Structure

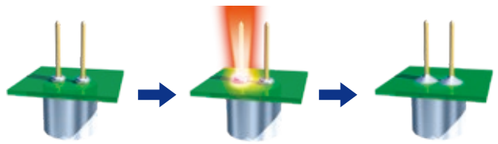
Flux Cored preform has flux inside the preform. In addition to eliminating the flux application process, storage and handling are also easier due to the solid stability. Customers can choose alloys and flux according to the requirements and purposes.

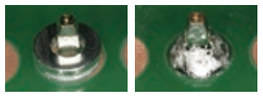
Applications

Assembling metal components



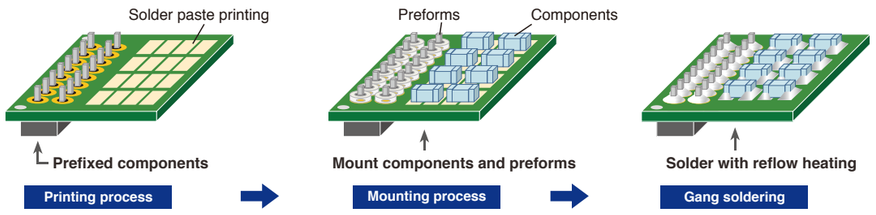
Selective heat soldering of heat-sensitive components





Soldering without damaging the substrate or other 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

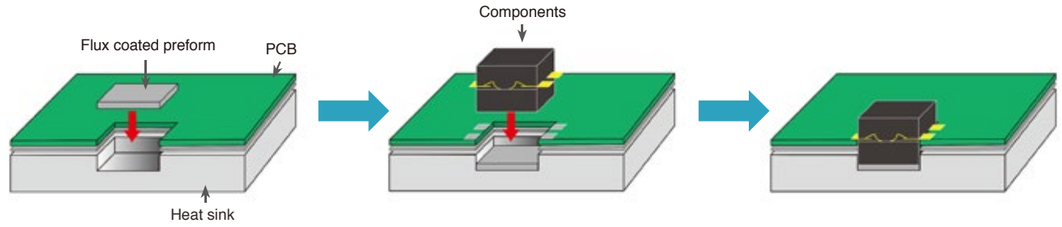
- Flux application is not necessary.
- Allows the paste to be applied to hard-to-apply uneven surfaces.

Shape

Structure

Flux Coated preform is the general-purpose preform which is evenly dry-coated with flux, eliminating the need of manual fluxing.

Applications

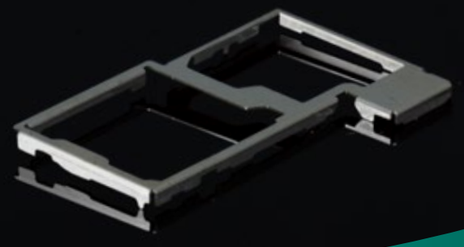


Select coating flux according to the purpose

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.

Please contact us about available flux types.

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.

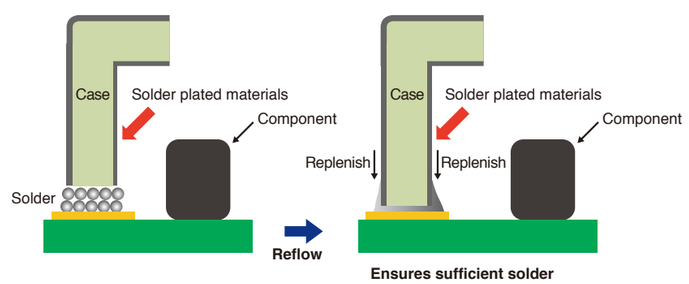
Shape

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.

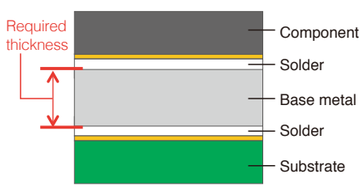
Applications

Component for hermetically sealed devices



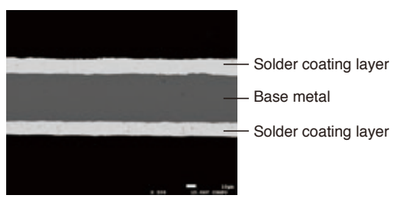
Performance

Ensures standoff and adds joint characteristics



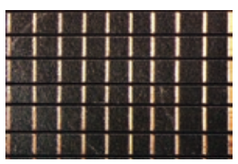
Base metal can be used as a spacer

Uniformity of the solder coating layer



Forms 10 to 25 µm solder coating thickness

Maintains peel resistance



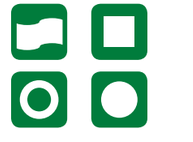
Molten solder coating layer does not peel (JIS K5600: Crosscut method)

Double Layered

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.

Shape

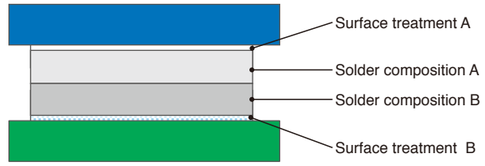


Structure

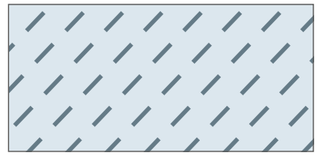
Double layered preform is a multifunctional product where two solder alloys with different properties are roll cladded. Enables two-step joints by temperature and optimum composition solder joints with different materials and treatments by utilizing the difference in temperatures and mechanical properties.

Applications

Joining with optimum solder composition for bonding surface conditions



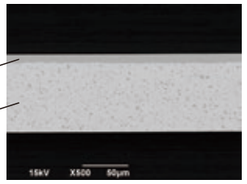
Surface treatment for identifying the composition of the surface

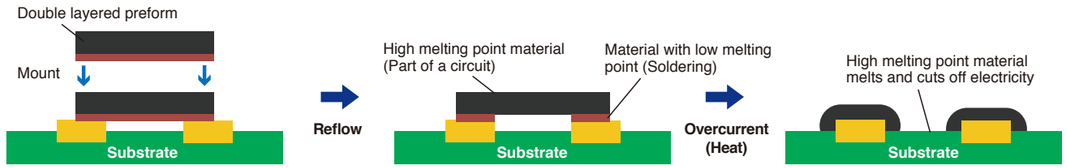


Designated surface can be engraved

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 ℃	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

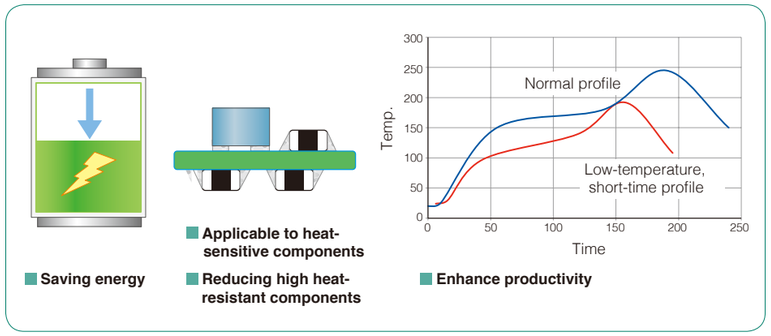
Realization of *fixed shape & quantity* by low-temperature, Bi-based solder preform

Typical composition

L20
(Sn-58Bi)

139 – 141°C

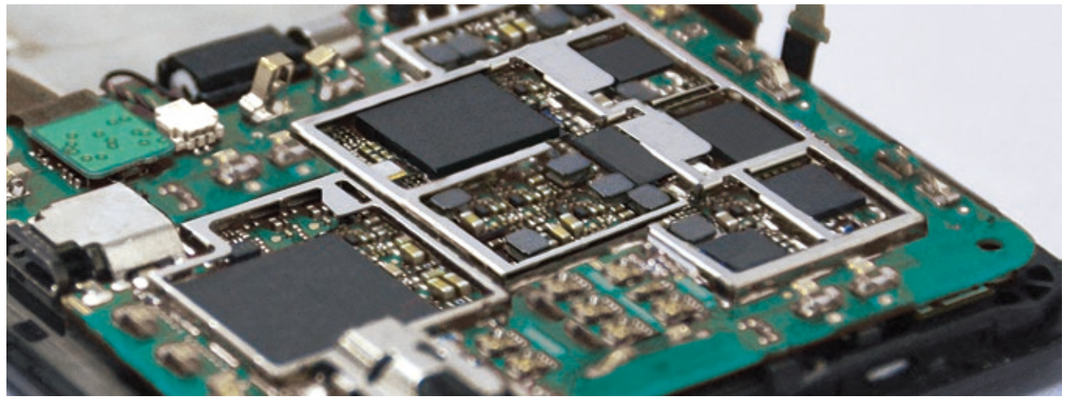
Improving mass production stability for low-temperature soldering and effective for solder feeding methods to which solder pastes are difficult to apply.



Base Material Physical Properties for Solder Coated Metal

Metal base material	Metal No. JIS	Classification	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)
Nickel silver	C7521	O	1110 [2030]	Zn-63Cu-18Ni	≧375	≧20	-	125	16.2(30-300℃)	8.73	6	33	0.377
		½H	1110 [2030]	Zn-63Cu-18Ni	440-570	≧5	120-180	125	16.2(30-300℃)	8.73	6	33	0.377
		H	1110 [2030]	Zn-63Cu-18Ni	≧540	≧3	≧150	125	16.2(30-300℃)	8.73	6	33	0.377
	C7701	H	1055 [1931]	Zn-56Cu-18Ni	630-735	≧4	180-240	125	16.7(30-300℃)	8.70	5.5	29	0.377
Copper	C1020	H	1083 [1981]	≧Cu99.96%	≧275	2-15	≧80	110-128	17.0(20-100℃) 17.7(20-200℃)	8.94	101	349	0.38
	C1100	H	1083 [1981]	≧Cu99.90%	≧275	2-15	≧80	110-128	17.0(20-100℃) 17.7(20-200℃)	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 soldering of electronic power devices

Typical composition

M14
(Sn-10Sb)

245 – 266°C

Supplying fixed quantity of high-strength solder ensures reliable soldering that can withstand severe environments such as those in automotive, industrial, and aerospace equipment.