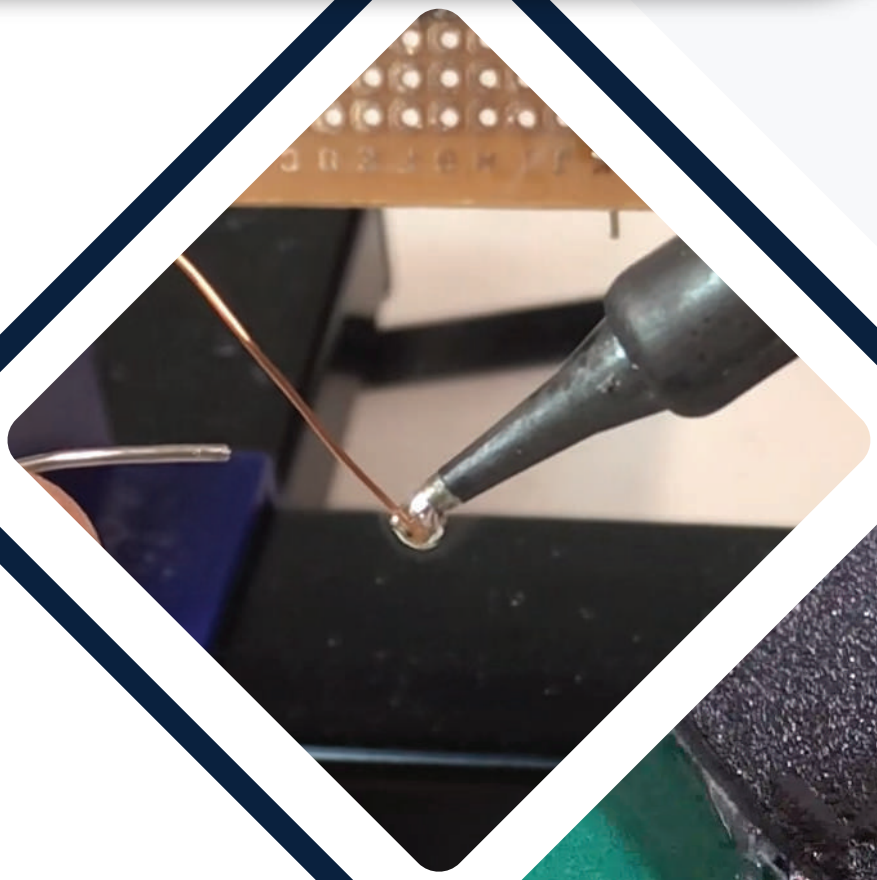
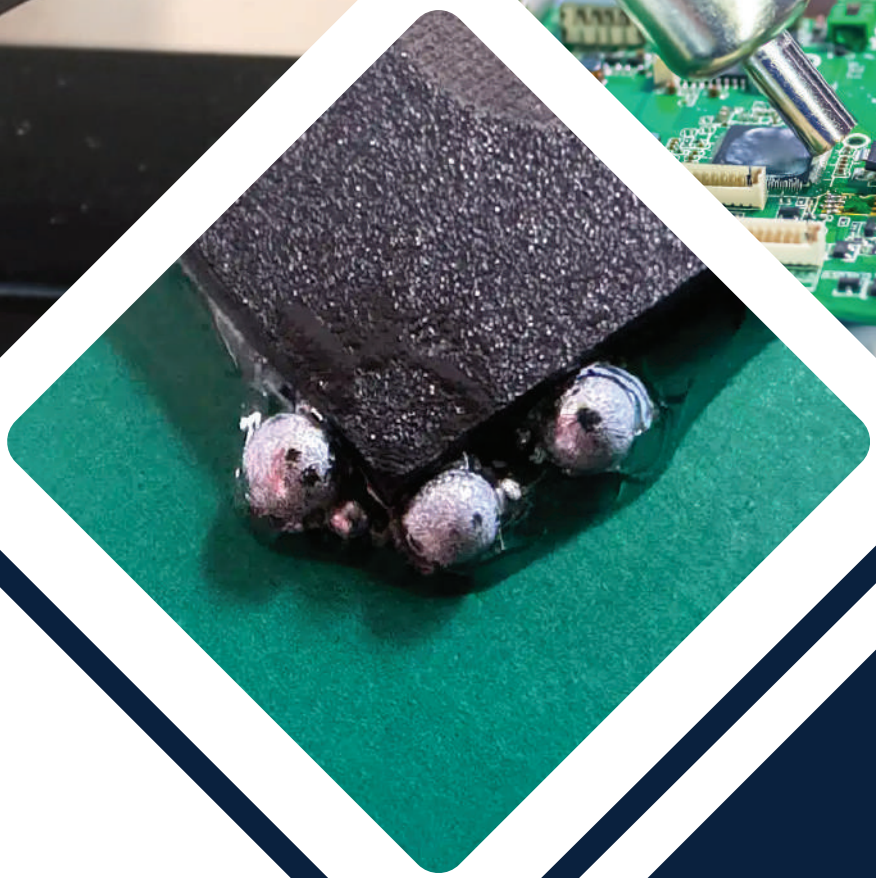
EXIM & MFR ENTERPRISE

Your partner in single source solutions

A BULTEN Company

2024





SOLDER PRODUCTS

Company Profile

COMPANY DETAILS

Global
Distributor

1982
Year Established

148
Employees

40,000+
Number of Line Items

155+
Commodity Groups

Vision
To be the global market leader in inventory management of mechanical and electro-mechanical components by being the link between world-class suppliers and global customer base.

Mission
We provide through our expertise, knowledge and network of global suppliers, the best quality products and services that we specialize in for our customers in the various industries.

Quality Management Certifications

AS 9120	Aerospace	**ISO 22301**	Business Continuity
ISO 9001	Business Enterprise	**ISO 26000**	Social Responsibility
ISO 13485	Medical Devices and Services	**ISO 29001**	Oil & Gas
ISO 14001	Environmental	**ISO 45001**	Occupational Health & Safety

Certified by: DNV & TÜV SÜD

Values

Professional — We take full responsibility throughout the value chain, delivering quality at every stage and making sustainability a natural part of all activities of our company. In the relation with our customers we are responsive, friendly and accountable.

Receptiveness — Meeting Changes, Customizing, Maintaining Communication.

Innovative — We are constantly pushing the boundaries of our business. With proven new technology and creative ideas we are striving to improve fastener applications, quality and enhance cost-efficiency.

Dedicated — We are passionate about the fastening business and will always go that extra mile to meet the expectations of our clients. We are proud to carry forward the long heritage of Bulten into a challenging and exciting future.

Empowered — At Exim you will meet highly skilled and motivated people empowered to make decisions and drive progress. Thus, you can be certain we will keep our promises and provide you the strongest possible solution for your fastening demands.

Vendor Managed Inventory (VMI) Programme:

- Ship-To-Stock
- Kanban System
- Hub Programme
- Two-Bin System
- Just-In-Time
- Consignment
- Demand Pull
- Schedule Sharing

Value-Added Services

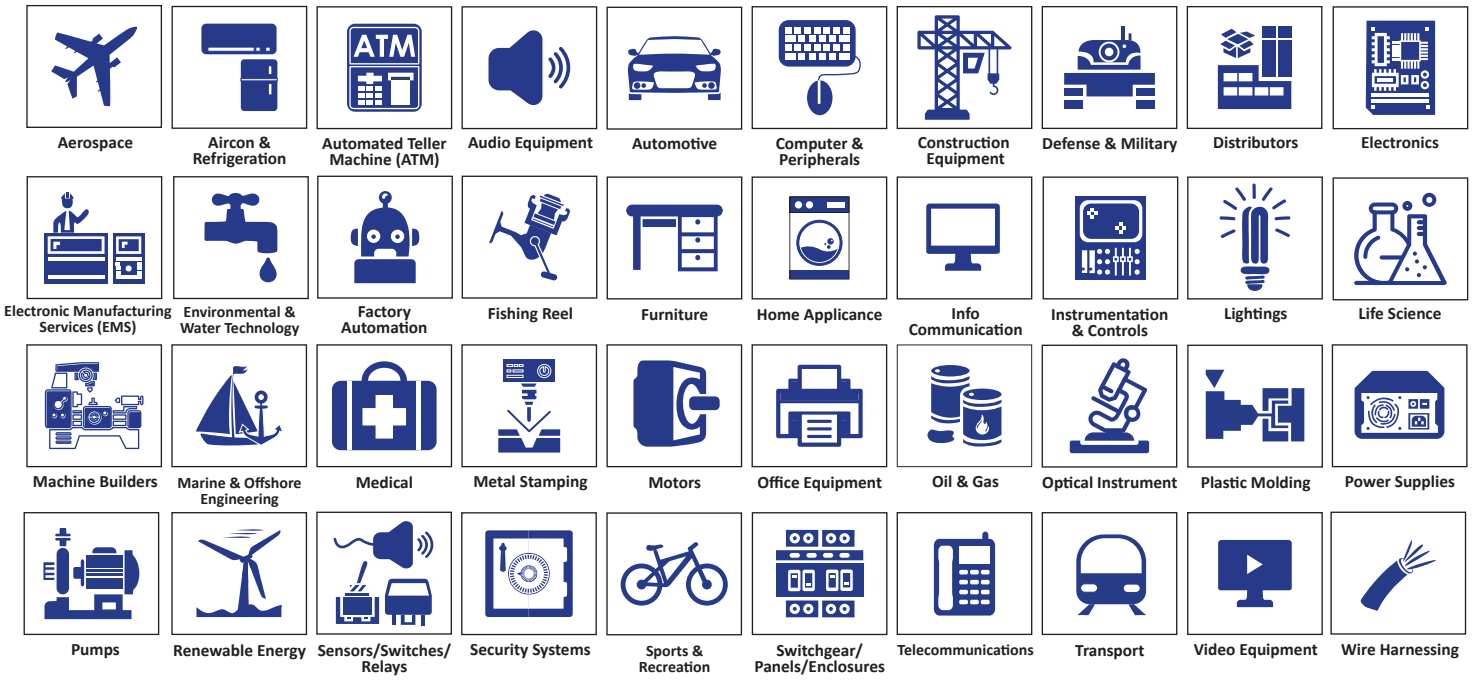
Our in-house capabilities include:

- Loctite Coating
- Nylon Patching
- Waxing of Fasteners
- Painting
- Drilling
- Cutting
- Printing
- Kitting
- Assembly

Standards
ANSI, DIN, IFI, JIS, Military (MS), Army Navy (AN), and National Aeronautical (NAS). Customized parts according to your specifications from more than 2,000 trusted and reliable suppliers.

Send Us Your Inquiries
We quote to your required specifications & quantity. Let us help to reduce your sourcing and purchasing costs.

Industries Served:



Solder Materials

Bar · Wire Solder

Bar Solder

Type	Dimensions (mm) Width	Thickness	Length	Weight / box
Extrusion	22	8	385	20~25kg
Casting	19	9	400	

Please refer to the following list for corresponding alloy types.

Wire Solder

Wire diameter (mm)	Weight / roll
0.3~3.0φ	0.5kg 1.0kg

Please refer to the following list for corresponding alloy types.

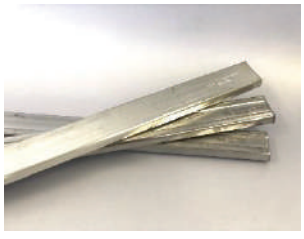
List of lead–free solder product guides

Alloy composition (wt%)	Melting temp (°C) Solidus line	Liquidus line	Product type Bar	Wire	Flux-cored	Prefomed	Paste
Sn/Ag3.0/Cu0.5	217	219	◎	◎	◎	◎	◎
Sn/Ag3.5/Cu0.7/Bi/Sb/α	211	222	●	●	●	●	◎
Sn/Ag3.5/Cu0.7	217	217	●				●
Sn/Ag3.5/Cu0.75	217	217	●			●	◎
Sn/Ag1.0/Cu0.7	217	224	●				●
Sn/Ag3.5/Cu0.5+Ni,Ge	217	219	◎	●	◎	◎	◎
Sn/Ag0.3/Cu0.7	217	226	●				●
Sn/Ag4.0/Cu0.5	217	219	●				●
Sn/Ag3.5	221	221	◎	◎	◎	◎	◎
Sn/Ag3.0	221	222	◎				
Sn/Cu0.7	227	228	◎	●			●
Sn/Cu0.7/Ni0.06/P	227	230	●				
Sn/Sb8/Ag3	232	252					◎
Sn/Sb10	246	272				●	●
Sn/Sb5	235	240	◎	◎	◎	◎	◎
Sn/Ag3.5/Bi0.5/In8.0	196	215				◎	●
Sn/Ag3.5/Bi0.5/In3.0	206	217				●	●
Sn/Bi58	139	139	●	●	×	×	●
Sn/Bi58/Ag1.0	136	138	●	●	×	×	◎
Sn/Bi57/Ag1.0	136	138	●	●	×	×	◎
Sn100	232	232	◎	◎	◎	●	●
Sn/Ag1.0/Cu0.7/Bi1.6/In0.2	210	222					●
Sn/Ag1.0/Cu0.7/Bi2.0	208	221					●
Sn/Ag25/Sb10	228	395		●			

◎=Standard ●=To be manufactured to order

List of general solder product guides

Alloy composition (wt%)	Melting temp (°C) Solidus line	Liquidus line	Remarks
Sn5/Pb95	300	314	High-temperature solder(300°C)
Sn1/Ag1.5/Pb97.5	309	309	High-temperature solder(300°C)
Sn5/Ag1.5/Pb93.5	296	301	High-temperature solder(300°C)
Sn10/Pb90	268	301	High-temperature solder(270°C)
Sn10/Ag2/Pb88	268	290	High-temperature solder(270°C)
Sn90/Pb10	183	212	Medium-temperature solder
Sn62/Ag2/Pb36	179	179	Temary eutectic silver solder
Sn65/Sb0.5/Ag0.4/Pb34.1	180	186	Tombstone/creep resistance
Sn63/Pb37	183	185	General eutectic solder



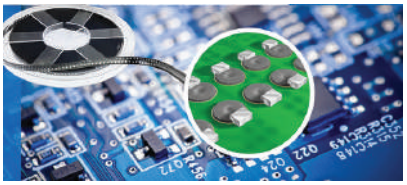
Solder bars

Wire solders

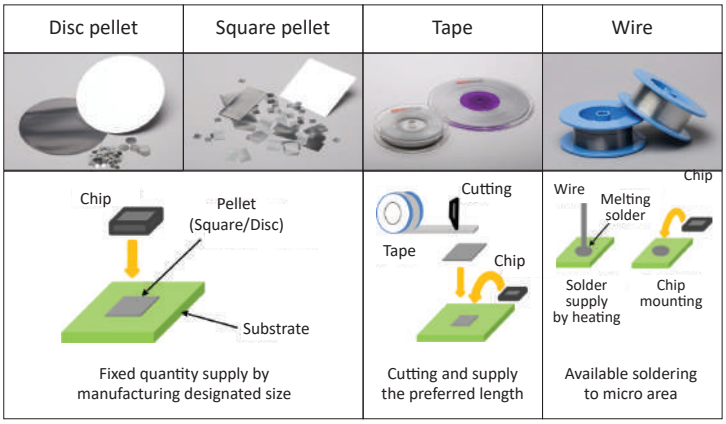
Preform Solder

Characteristics

- Uses high-purity alloy which minimizes impurities
- Vacuum degassing process named 'DG Method' enables to eliminate dissolved gas from Pb-solders, which is one of the causes for void formation
- Ensures excellent wettability without any taint, oil content, oxidized material, or scratches on the surface
- Smooth and no sticking of solders
- Embossed tape package available for the pellet types
- Proven track record for in-vehicle equipment, industrial equipment, and other fields requiring high reliability



Various shapes: pellet (disc, square), tape, wire



Good solderability

X-ray photogram after reflow

Ours Others

[Reflow condition]

- Sample : Sn/Sb5, 12mm x 12mm
- Substrate : Cu plate
- Peak temp. : 300° in the reducing gas

Application

Die bond for power devices, semiconductor IC, sealing package

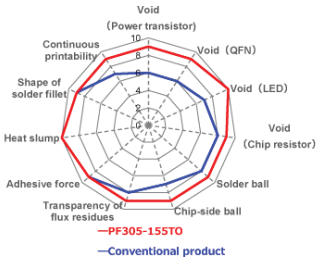
Products

Solder Materials

Solder Paste

Lead free solder paste for SMT [PF305-155TO]

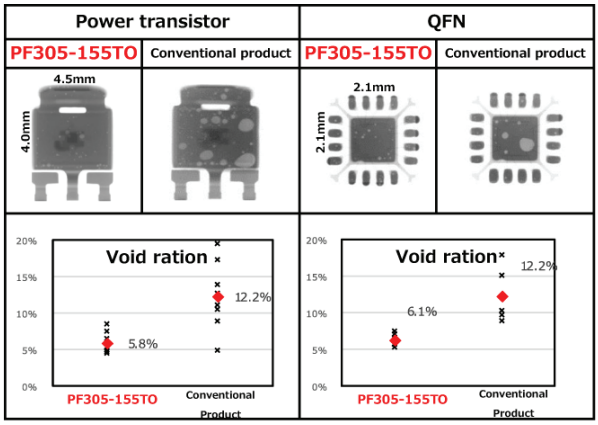
High-performance general-purpose product for versatile application



- Low void performance regardless of of parts or plating
- Reducing chip-side balls
- Good workability with high tackiness and good printed shape

Superior performance applicable with versatile requirements thanks to advanced technology of flux

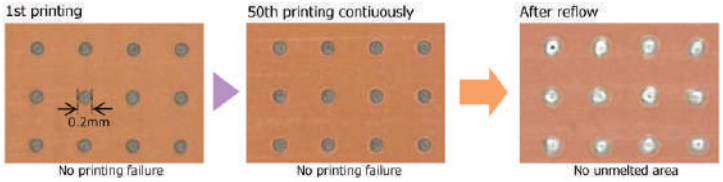
High void suppression effect at back electrodes



[Test condition]
Reflow：Air； Thickness of stencil：0.1mm; Preheat Temp.：150 to 190°C, 100sec.；Peak Temp.：240°C, 40sec. or more for 220°C

Fine Pb-free solder paste for SMT [PF305-153TO]

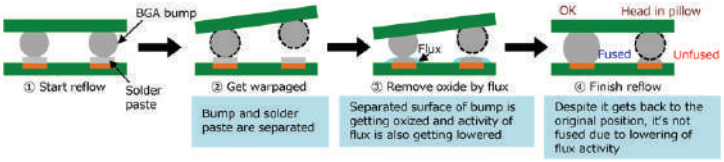
Secured fine printability and fine solubility required for BGA package
Fine solubility even at air reflow



[Test board]
- Substrate: FR-4
- Mask: 0.2mmΦ and 0.12mmT

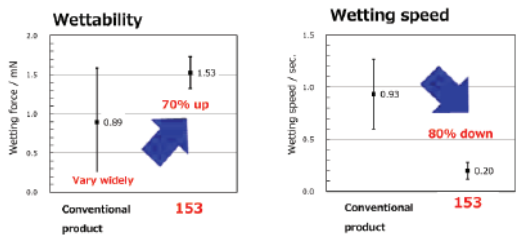
[Reflow condition]
- Air reflowing
- Preheating 100sec at 180 to 190°C
- Peak temp. 240°C, 26sec for 220°C

The mechanism how head in pillow defect occurs in BGA package



Schematic diagram of head in pillow defect caused by warpage in the package

Improved wettability with maintaining strong activity despite halogen free

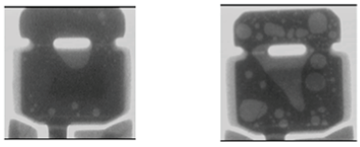


Halogen-free solder paste [PF305-140TO]

Excellent void reduction effect despite halogen-free flux

Excellent heat slumping prevention effect

PF305-140TO **Conventional product**



Power transistor

Preheating: 150–190°C 90sec
Peak temp: 240°C

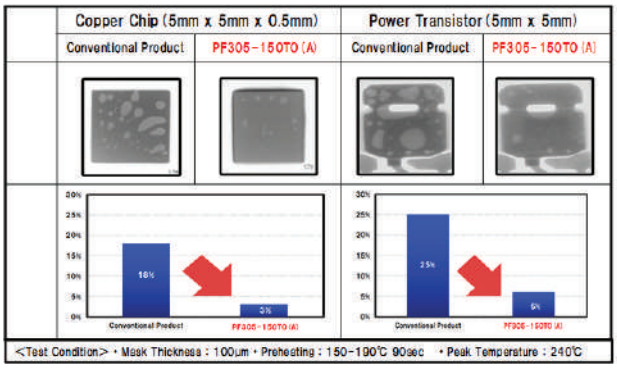
Preheating slumping test
(JIS Z 3284)

Halogen-free
Halogen free requirements for electronic equipment
Chlorine (Cl) < 900ppm
Bromie (Br) < 900ppm
Total < 1500ppm

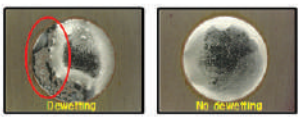
PF305-140TO realizes halogen free requirement as well as preventing void occurence for power transistors and other large areas of substrates. Also, prevention of slump after preheating is ensured, which is one of the characteristics of our products.

Solder paste [PF305-150TO(A7)]

Reducing Void Generation in Large Area Printing even at Air Atmosphere



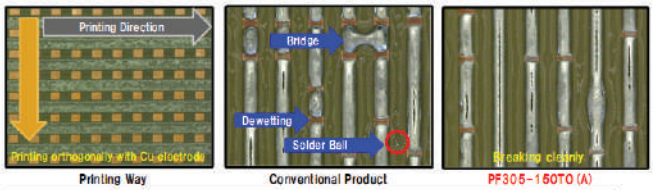
Good Wettability even on Oxidized Substrate at Air Reflow



Conventional Product PF305-150TO (A)

<Test Condition>
• Substrate : Oxidized Copper Plate
• Mask Thickness : 200μm, 6.5mmϕ
• Reflow : Air Atmosphere
• Preheating : 200℃, 90seconds
• Peak Temperature : 240℃

Less Solder Bridge and Less Solder Ball with Good Wettability



<Test Condition>
• Substrate : JIS II Interdigitated Alloy Electrode • Mask Thickness : 100μm
• Reflow : Air Atmosphere • Preheating : 150-190℃, 90seconds • Peak Temperature : 240℃

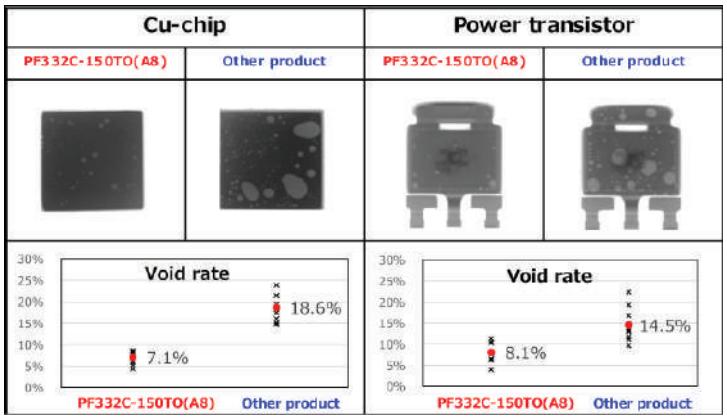
PF305-150TO(A) featured good wettability and inhibitory effect against void generation in large area printing at air atmosphere. Also it prevents viscosity change and shows well detergency with various cleanning fluids.

Solder Materials

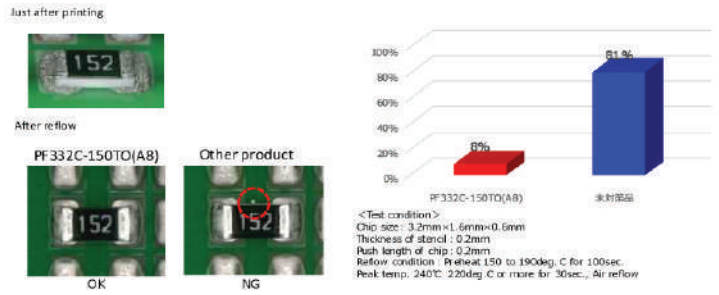
Highly reliable Pb-free solder paste for SMT [PF332C-150TO(A8)]

- Realized low void suitable for automotive application
- Adaptable same reflow profile with SAC305's
- Prevents occurrence of chip-side balls

Highly suppressed void on back electrodes
Effective to back electrodes indispensable to prevent void occurrence

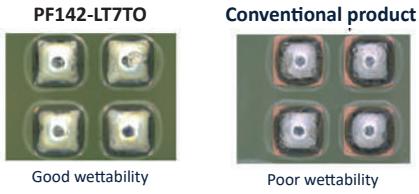


Prevent occurrence of chip-side balls
Prevent to occur chip-side balls even at excessive soldering volume



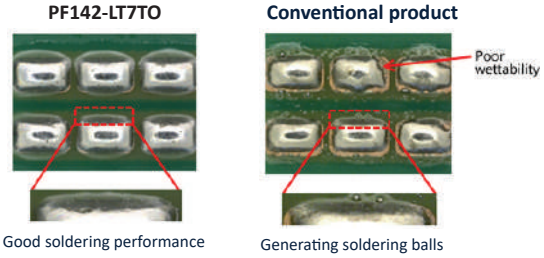
Low temperature solder paste [PF142-LT7TO]

Good wettability even with halogen-free



Preheating: 120–130°C 90sec
Peak temp.: 190°C

Excellent soldering property with low-temperature reflow



Preheating: 130°C 90sec
Peak temp.: 190°C

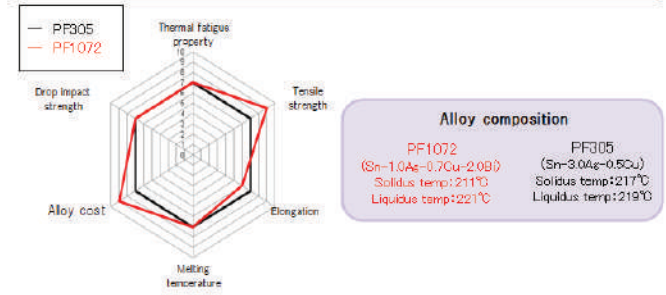
Halogen-free
Halogen free requirements for electronic equipment
Chlorine (Cl) < 900ppm
Bromie (Br) < 900ppm
Total < 1500ppm

PF142-LT7TO has been developed with Sn/Bi alloys.
Excellent wettability is ensured and halogen free standards are satisfied.

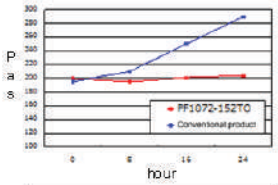
Ag solder paste [PF1072-152TO]

- The 2nd-generation reflow solder paste, Sn-1.0Ag-0.7Cu-2Bi recommended by JEITA
- Stably consecutive printability
- Superior inhibitory effect for void generation despite low silver content

Alloy Characteristics

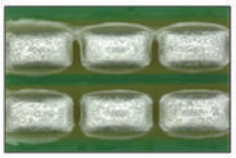


Stable consecutive printability



Only a little viscosity change even after 24 hours

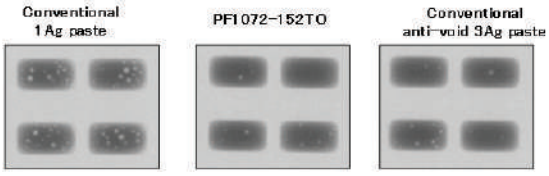
No deterioration even after 7days at 30℃



Good wettability
No solder ball generated

Substrate:CEM3 Preheating:150–190℃ 100sec
Peak temp :240℃

Superior inhibitory effect for void generetion despite low silver content



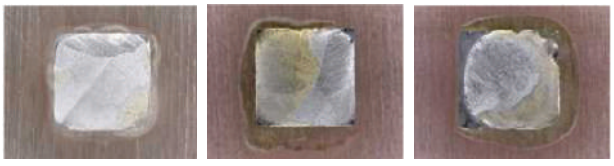
Substrate:CEM3 Preheating:150–190℃ 100sec Peak temp :240℃

Although we reduce the silver content from the conventional 3% to 1%. PF1072 can secure the alloy characteristics equivalent to those of PF305 by adding bismuth and is applicable with the same heating profile pf PF305.

Solder paste for power device die bonding [RX105-207SDO(HF-T)]

- Reduced flux residue despite maintaining good wettability
- Environment-friendly non-halogen type
- Good void suppression effect comparable to halogen-added products

Optimized flux design attainable both low residue and wettability



RX105-207SDO(HF-T) | Conventional halogen added product | Conventional non-halogen product

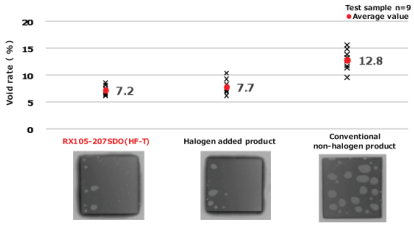
Less flux residue than conventional products, better wettability than conventional non-halogen products.

[Test condition]
N_2 Reflowing (O_2 concentration: 1000ppm)
Preheating: 180 to 190°C, 90 sec. 300°C or more, 65 sec.
Peak temp. 340°C

Optimized flux design attainable both low residue and wettability

Despite non-halogen, maintains same or better void suppression effect as compared to halogen-added products.

[Test condition]
N_2 Reflowing (O_2 concentration: 1000ppm)
Preheating: 180 to 190°C, 90 sec.
300°C or more: 65 sec.
Peak temp. 340°C
Test parts: 5mm Cu chip



Products

Solder Materials

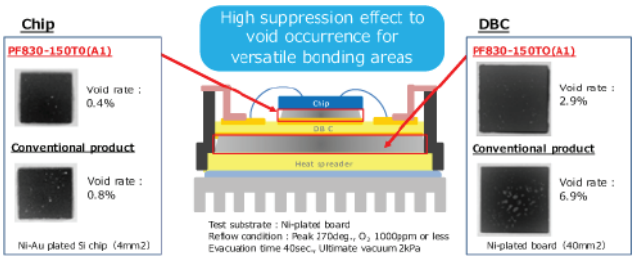
Sn-Sb type solder [PF830-150TO(A1)]

High reliable alloy suitable for power module application

	Unit	Representative values			Test Method
Nihon Handa Alloy Number	—	PF830	24	PF305	–
Solder Alloy	—	Sn-8.0Sb-3.0Ag	Sn-5.0Sb	Sn-3.0Ag-0.5Cu	--
Solidus – Liquidus	deg. C	232 – 252	235 – 240	217 – 219	JIS Z 3198
Gravity	g/cm³	7.3	7.3	7.4	Theoretical Calculation
Tensile Strength	MPa	75.8	38.1	40.6	Tensile Test Method
Elongation	%	36.6	53.4	66.5	Tensile Test Method
Young's Modulus	GPa	59.0	46.9	50.1	Ultrasonography
Poisson's Rate	—	0.29	0.36	0.33	Ultrasonography
Thermal Conductivity	W/m・K	41.6	39.8	55.0	Xe Flash Method
Linear Expansion Coefficient	ppm/℃	24.2	26.4	21.0	TMA

Optimum flux performance suitable for bonding power module

- Low void bonding even under Ni-plated DBC

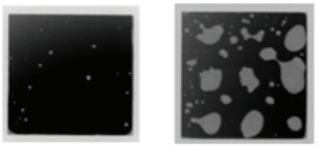


Excellent wettability solder paste [PF305-V302HO]

- Excellent void reduction effect regardless of reflow condition
- Improved wettability for nickel platings and fewer voids
- Applicable to bond large areas such as those of power semiconductors
- Cleanable with various types of cleaning liquids

Excellent void reduction effect

PF305-V302HO | Conventional product



Void rate: 2%

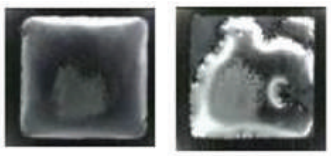
Void rate: 25%

Au plating silicon chip

Air reflow
Preheating: 150–190°C 90sec
Peak temp. 240°C

Improved wettability for Ni

PF305-V302HO | Conventional product



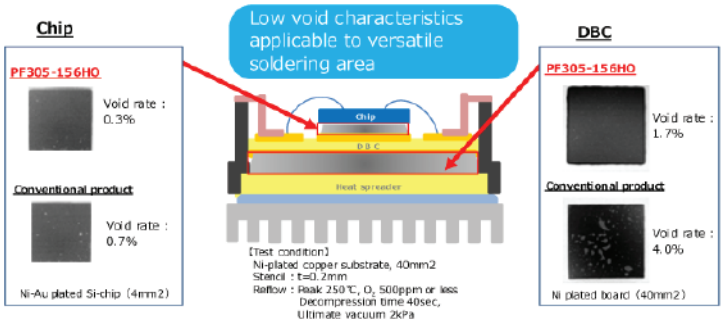
Ni plated brass plate

N_2 reflow, O_2 concentration: 1000ppm
Preheating: 150–190°C 90sec
Peak temp. 240°C

Solder paste for power module application [PF305-156HO]

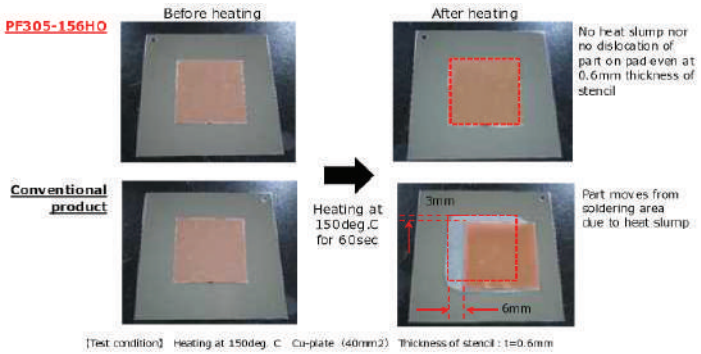
- Effective low void for both under chip and DBC regardless of soldering area
- Prevent dislocation of parts on pad during reflow
- Applicable with versatile cleaning agent against flux residues

Optimized characteristics for soldering power modules



Prevent dislocation of chip

Reduce heat slump & fluidity at preheating and prevent dislocation of part on pad during reflow

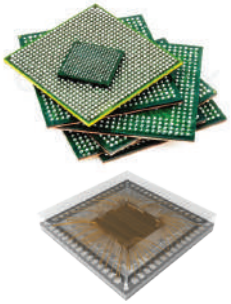
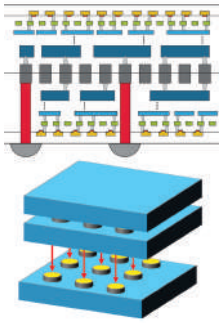


Excellent cleanability

Alcohol | Glycol | Hydrocarbon

PF305-V302HO is a high-performance type which significantly reduces voids on large solder joint areas such as those of power semiconductors. Also, good cleanability is ensured for various types of cleaning liquid.

Solder Materials Applications

PCB Assembly	Leadframe	BGA/LGA, Embedded Bridges/FOWLP	2.5D-IC Silicon Interposers	3D-IC Chip on Wafer
 Printed circuit boards (PCB) during wave solder or solder dip process				

Joint Materials

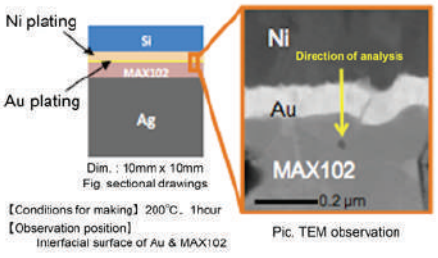
Sintering Metal Paste

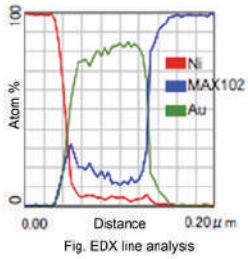
Metal adhesive “MAX series” [MAX 102, 1022, 112]

The sintering metal paste MAX series is a line up of new paste products with high thermal conductivity, high conductivity, and high thermal stability. They can be used for pressureless sintering by utilizing the high surface energy of metal particles.

- New Joint Material alternative to Pb-rich solder or Au-Sn solder
- High melting temperature after 200°C to 250°C curing without pressure

Forms metal joints with high reliability





MAX102 Standard type, Reflow peak 200°C, Available substrate Au · Ag

MAX1022 Available joint Cu substrate and also Au or Ag, Large size chip, Reflow peak 250°C

Properties	MAX102 Standard 200℃, 60min.	MAX1022 Low-Viscosity 200℃, 60min.	MAX112 Low-Temp. sintering 150℃, 120min.	Remarks
Appearance	Silver white	Silver white	Silver white	
Viscosity (Pa.s)	15	10	15	E-type viscosity meter 25℃, 20rpm
Adhesive strength (MPa)	35	37	30	Ag plate die share measuring instrument
Tensile strength (MPa)	62	—	49	Tensile tester
Young's modulus (Gpa)	14.8	—	8.1	Ultrasonic wave speed method
Poisson's ratio	0.23	—	0.22	Ultrasonic wave speed method
Vickers hardness	25	—	22	JIS Z 2244 (HV0.025、15s)
Coefficient of thermal expansion (ppm)	19	—	19	TMA
Thermal conductivity (W/m・K)	213	176	182	Laser flash method
Thermal resistance (℃/W)	<0.03	<0.03	<0.03	Steady method
Volume resistivity (Ω・cm)	$7.5x10^{-6}$	$7.6x10^{-6}$	$8.3x10^{-6}$	JIS K 7194 (Testing method with a four-point probe array)
Melting temp. (℃)	>900	>900	>900	
UV resistance	Excellent	Excellent	Excellent	
Contamination, residue	Don't need cleaning	Don't need cleaning	Don't need cleaning	
Adherend	Au Ag Pd Pt	Au Ag Pd Pt	Au Ag	
Forming of thick film	10mm over	10mm over	10mm over	
Storage stability	3 months at room temp.	6 months by freezing at -20℃	6 months by freezing at -20℃	

Recommended Usages

- Can be used for the following examples by utilizing an excellent transferring property, discharging performance, thermal conductivity, high thermal resistance, conductivity, ultraviolet light resistance, and zero-outgas property as well as other characteristics

- Die attaching material for power devices and power modules
  - Die attaching material for high-frequency devices
  - Die attaching material for optical devices
  - Thermoelectric element

Conductive Adhesive

Electrical Conductive Adhesive (ECA) – Epoxy silver paste: ECA100 series

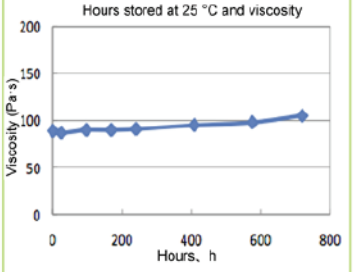
- One-component paste mixed with metal fine particle and epoxy resin
- Low temperature curing & stable electrical conductivity

	Properties	ECA100	ECA151	ECA170	Test method
Before curing	Viscosity (Pa・s)	89	110	150	E-type viscosity meter
	Specific gravity	4.8	3.4	3.3	JIS Z 8804
	Storage stability (25℃)	30	90	30	Our test method
After curing	Curing temp. (℃)	90	150	150	Our test method
	Adhesive strength (MPa)	6.6	12.3	6.6	JIS K 6850
	Volume resistivity (Ω・cm)	$5.0x10^{-4}$	$5.0x10^{-4}$	$2.0x10^{-4}$	JIS K 7194
	Hardness	62	78	82	JIS K 7215
	Glass transfer temp. (℃)	100	70	100	DMA
	Coefficient of thermal expansion (ppm) α1	31	30	33	TMA
	α2	79	90	96	
Applying method		Print Dispense	Print	Print	
Storage		Room-temperature 30 days	Room-temperature 90 days	Room-temperature 30 days	
Characteristics		Low-temp. curing	High-strength	High-definition printing	

Characteristics of the ECA100 series

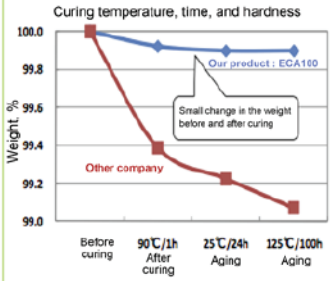
Room-temperature storage stability

- Usable after 30 days at room temperature (25 ℃)
  Removal after setting to dispensers is not required
  ⇒ Quality stabilization
- Storable for 6 months by freezing (minus 20 ℃)
  Super freezer is not required.
  ⇒ Energy conservation and low cost
- No increase in the viscosity during use
  Full discharging is possible. ⇒ Low cost



Low outgas

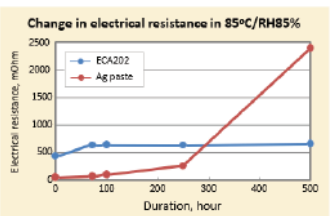
- Small amount of outgas during / after curing
  No contamination in the surrounding areas
  ⇒ High qauality
  ⇒ Compatible with inner-device connections
  ⇒ Compatible with sealing packages



ECA151	ECA170	ECA170L
●Room-temperature storage type Cost can be reduced by mitigating the temperature control condition during transportation/storage. High adhesive strength	●High-definition printing type Applicable to surface mounting without slumping after printing. Usable for 30 days with room-temperature storage at 25℃.	●For syringe dispensing Smooth wetting to adherend, without surface peaking after applying.

Epoxy nickel paste: ECA202

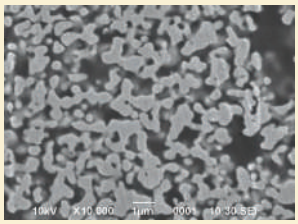
- Nickel particle epoxy paste
- Cured more than 70°C
- Suitable for tin electrical pad



Epoxy nickel paste: ECA300

- Hybrid type with epoxy curing and sliver sintering
- High electrical conductivity and high thermal conductivity
- Flexible after curing

The sintered status after curing



Joint Materials

Thermally Conductive Grease (TCG)

Non-silicon thermal conductive grease: TG200 series

- TG200 series is non-silicon thermal conductive grease
- Excellent thermal resistance without volatile such as those of siloxane
- A thermal conductivity of up to 6W/m·k and thermal resistance of 0.05°C/W

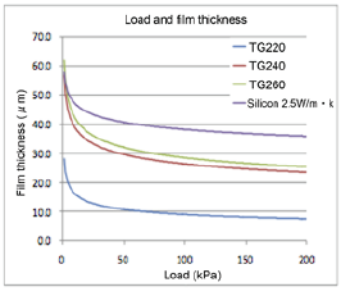
Characteristics of the TG200 series

Non-silicon, thin-film coating, and low heat resistance

Properties	TG221	TG240	TG260	Test method
Thermal conductivity (W/m・K)	2	4	6	Steady comparison method
Viscosity (Pa・s)	110	180	280	E-type viscosity meter (3rpm)
Consistency	Over 300	280	210	JIS K 2220
Oil separation (%)	0	0	0	JIS K 2220
Volume resistivity (Ω・cm)	$>10^{12}$	$>10^{12}$	$>10^{12}$	JIS C2101
Minimum film thickness (μm)	5	30	30	Load:500kPa
Thermal resistance (℃/W)	0.05	0.1	0.1	
Remarks	Applicable to thin film	Excellent coating	High thermal conductivity	—

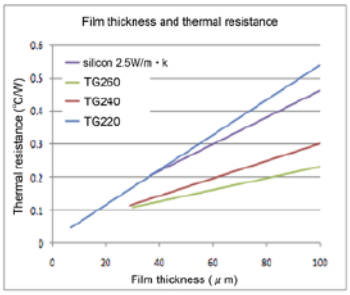
Allows thin film with low load

- TG221(2W/m·K) spreads well with a small load and can make a thin BLT.
- TG240 (4W/m·K) and TG260 (6W/m·K) are high-temperature conductive types, and it is difficult to make a thin BLT with these products. However, with the 2.5W/m·K type, thin BLT is obtainable.

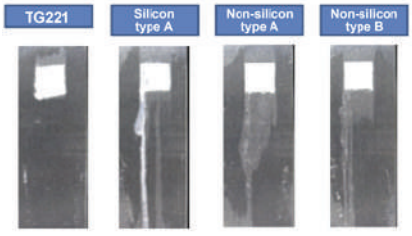


Allows low thermal resistance due to thin film

- TG221 spreads well with a small load and can make a thin coating.
- If you want a thin BLT, TG221 is the best option.
- TG240 and TG260 can maintain good thermal conductivity because the increase in thermal resistance is small even for a thick film.



TG221: Dripping during vertical installation



Evaluation method

Grease is applied to aluminum plates setting as actual use conditions.Plates are vertically installed and a temperature cycle test (− 40 ⇔ 125℃) is run.

Result

TG221 has a small amount of distilling and dripping, and the amount of grease removal during vertical installation is also small.

- Heat dissipation material of reducing the temperature rise for the electric device
- Non-silicone type to no electrical contact failure by low molecular weight siloxane

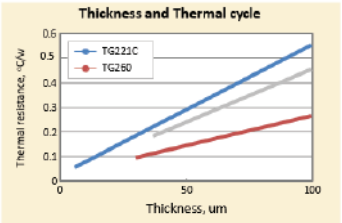
TG221C / TG260

TG221C

- Good workability, good spread ability
- Thin thickness of 10um or less

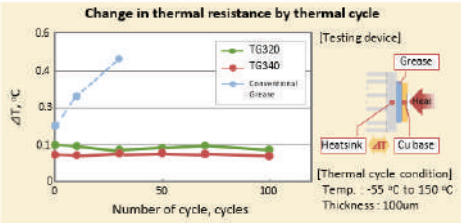
TG260

- High thermal conductivity 6W/m-°C



Thermal conductive grease: TG320 / TG340

- Keeping viscosity when rising temperature
- Suppress the pump-out and the falling out

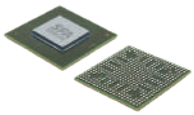


Common Applications

Thermally conductive formulations are used for bonding, coating, potting and encapsulation applications in a wide variety of industries. Some specific applications include:

- Heat sink bonding
- Potting/encapsulating sensors
- BGA die heat spreader interface
- Chip scale packages
- Power semiconductors

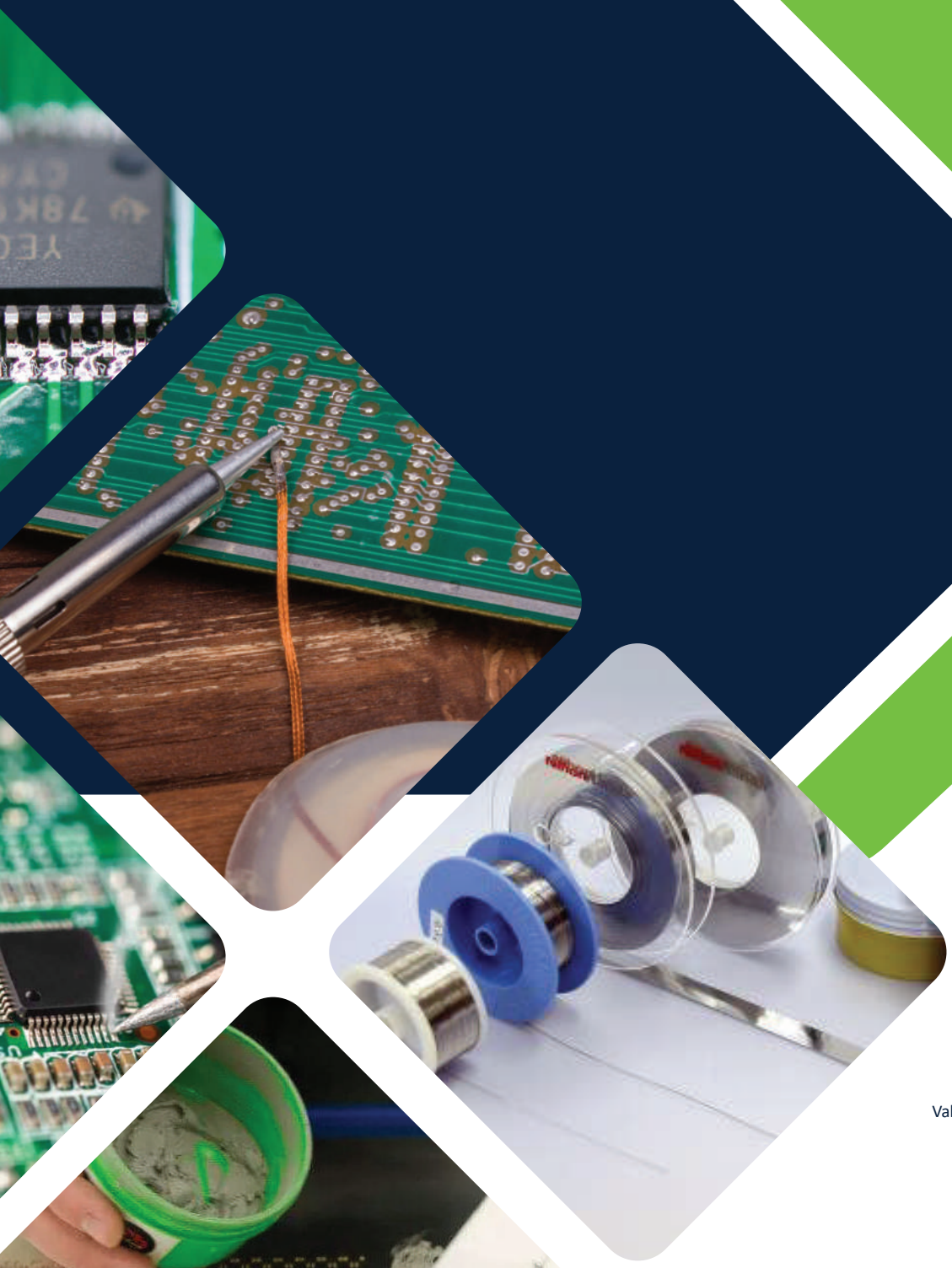
Heat sink bonding

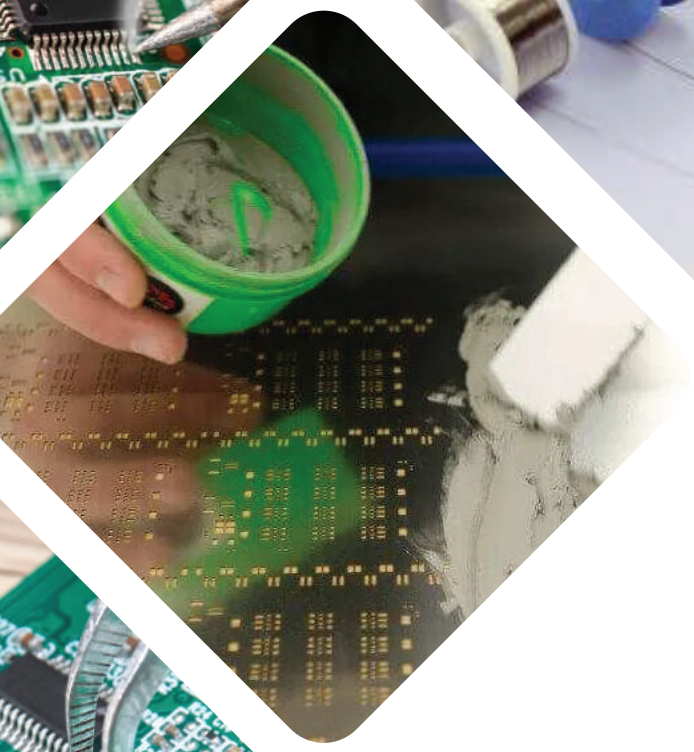


Chip scale packages

Potting/encapsulating sensors

Power semiconductors





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