YOUR ULTIMATE CHOICE
FOR SOLDER
Valuable Solutions and Services

Company Profile

Founded in 1973, **SHENMAO** Technology Inc. offers total solutions of solder materials to customers by meeting and exceeding their quality and reliability requirements with products and service satisfaction accumulated over four decades of research and development experience. **SHENMAO** works closely with customers to develop new application nanotechnology product for the electronics and other industries. From production to shipment, strictly controlling each step, **SHENMAO** uses only ultra-pure virgin raw materials to produce high-quality products. Through continuous improvement, cost reduction, swift sales and service, **SHENMAO** works hard to help customers remain competitive, creating a win-win situation. **SHENMAO** Technology Inc., as the third largest Solder Materials provider, produces and markets SMT Solder Paste, Semiconductor Packaging Solder Spheres, Wafer Bumping Solder Paste, Dipping Flux, Wave Solder Bar, Solder Wire, Flux and Solder Preforms distributed from 10 worldwide locations, as the strategic manufacturing partner of leading OSATs, the 2017 top 12 of 13 largest EMS Companies and OEMs. **SHENMAO** Technology Inc. strives to offer the best quality without compromising cost and time-to-market while providing maximum value to all customers, always through superior customer service and technical support. Customer satisfaction and sustainable high quality are always **SHENMAO**’s priority.

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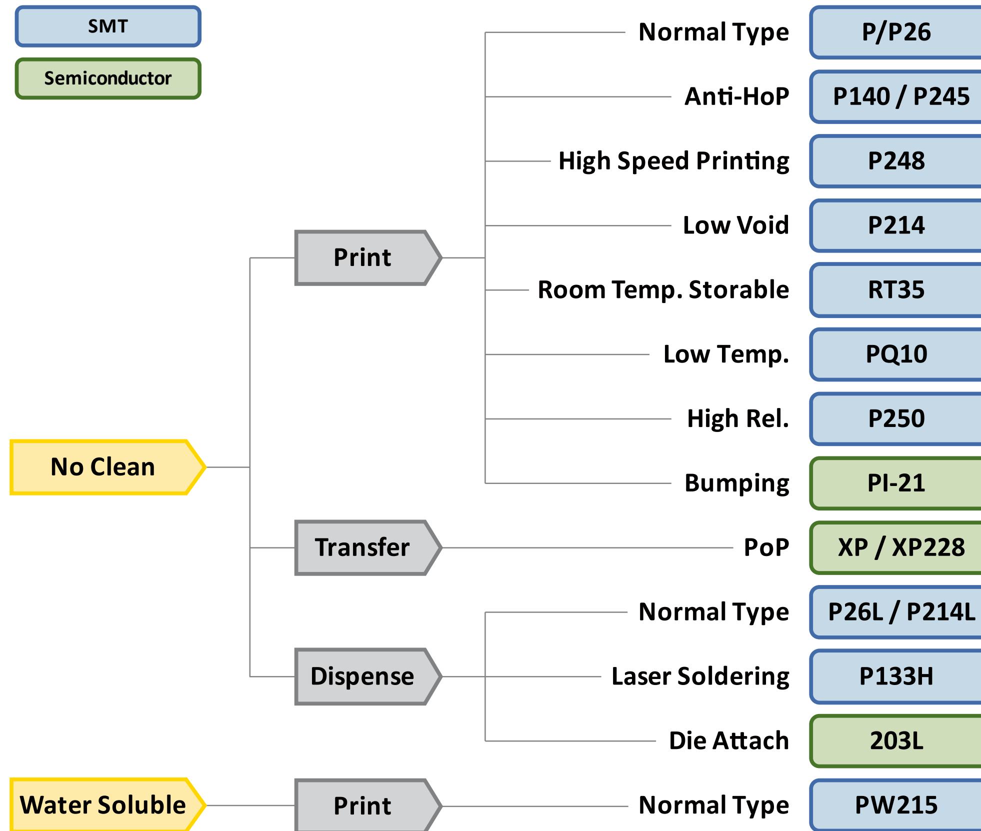
19 Solder Bar

20 Main SHENMAO Alloys

Solder Paste

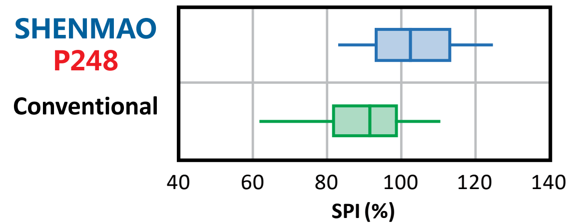
Product Guide



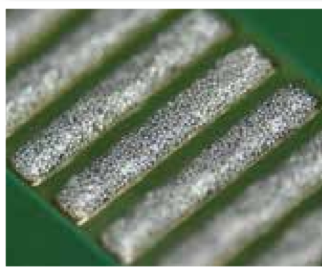
SHENMAO P248
High Speed Printing Solder Paste

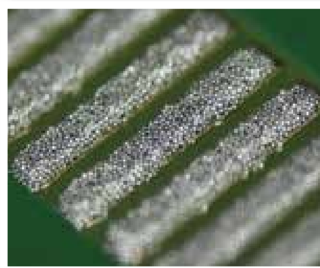
- Excellent High Speed Printing
- Excellent Voiding Prevention
- Nitrogen Atmosphere Reflow

Solder Deposition

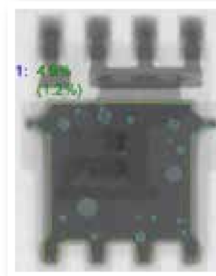


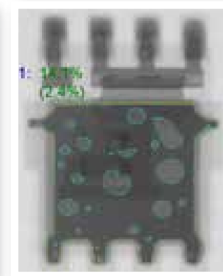
Appearance after Printing


SHENMAO P248


Conventional

Voiding

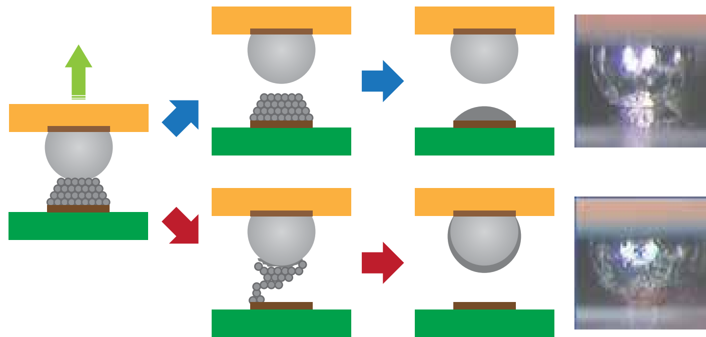

SHENMAO P248


Conventional

SHENMAO P245
Anti-NWO/HoP, Halogen-free Solder Paste

SHENMAO P140
Anti-NWO/HoP, Halide Solder Paste

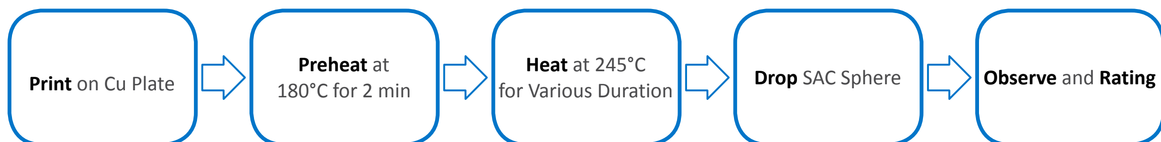
- **SHENMAO P245**: ROL0, Zero Halogen
- **SHENMAO P140**: ROL1



Root Cause of HoP
- Oxidation of Solder Sphere and Powder
- Flux Slumps during Reflow

Root Cause of NWO
- Non-wetting between Flux and Pad
- Low Tackiness Force at High Temperature

Anti-HoP Test



Standard	Class A	Class B	Class C	Class D
% of BGA Melted	>75%	50~75%	25~50%	<25%

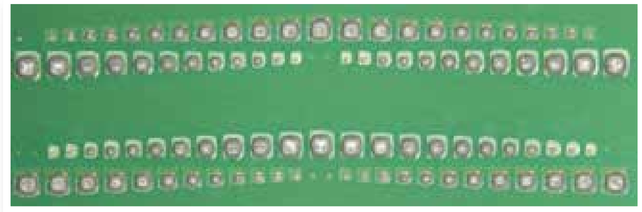
Heating Time	20s	40s	60s	80s
SHENMAO P245	Class A	Class A	Class A	Class B
SHENMAO P140	Class A	Class A	Class A	Class B
Conventional	Class A	Class B	Class C	Class D

P245 and **P140** Can Solve NWO and HoP Problems

SHENMAO PW215
Water Soluble Solder Paste

- Great Printability
- Wide Process Window

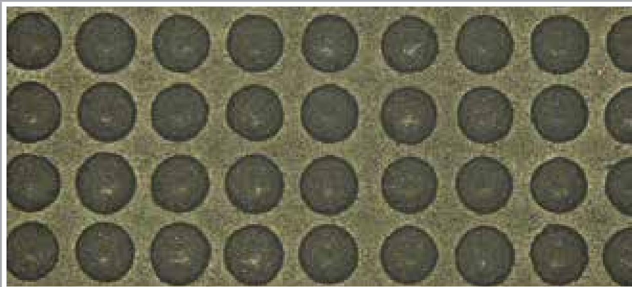
Printability (3mil~15mil)



Great Printability

Continuous Printability

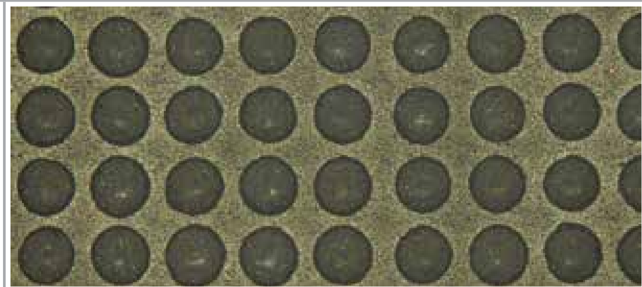
After 12hrs Printing



Great Deposition Remains after 12 Hours of Printing

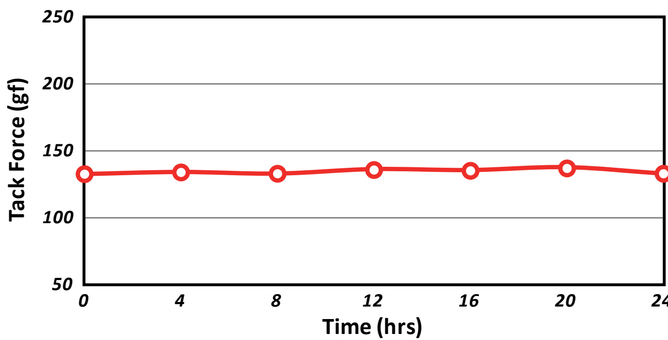
Anti-slump

After 12hrs Printing & 6hrs Stand



Great Anti-slump Property Remains after 6 Hours Stand

Tack Force



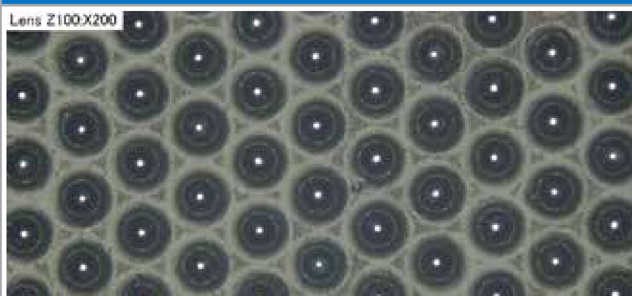
Tack Force Remains >130gf after 24 Hours Stand

Solderability

Initial	After 19hrs Stand

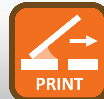
Paste Activity Remains after 19 Hours Stand

Cleanability

Before Cleaning	After Cleaning
	

No Flux Residue after Cleaning

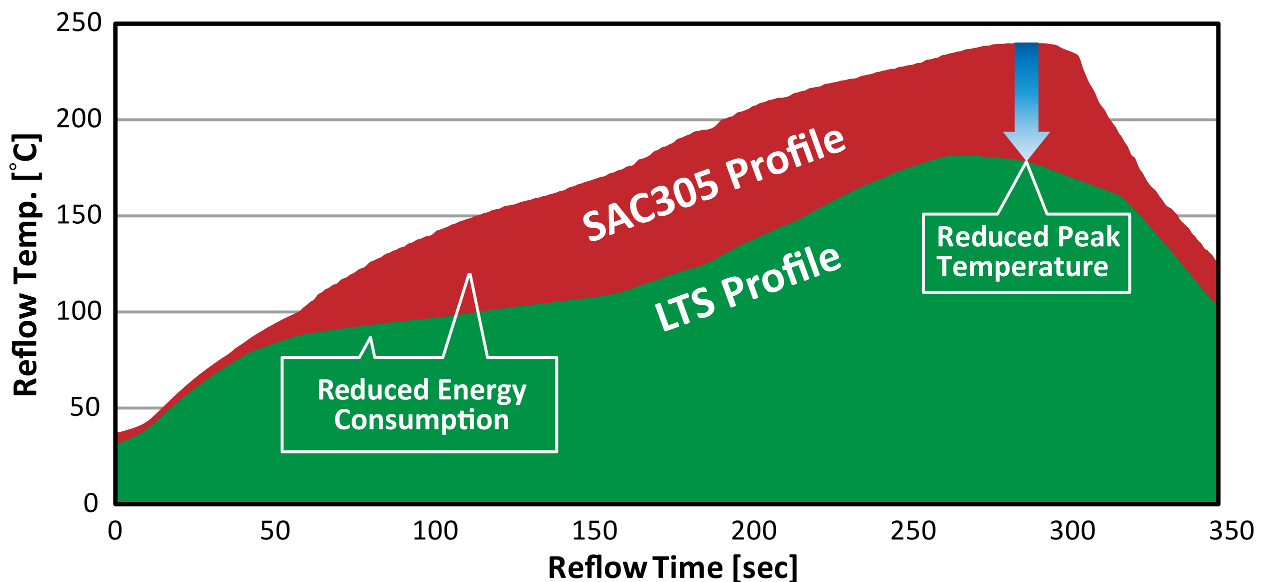
SHENMAO PQ10
Anti Hot Tearing Low Temp. Solder Paste



Alloy Model	PF735
Melting Point	137-142°C
Suggested Peak Reflow Temperature	155~185°C

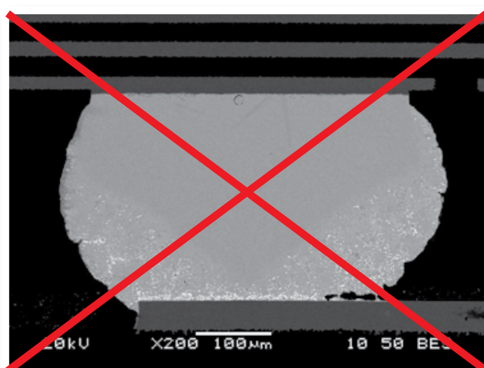
Comparison with SnAgCu

- Reduced Peak Reflow Temperature
- Reduced Energy Consumption
- Reduced Warpage of PCB and Components

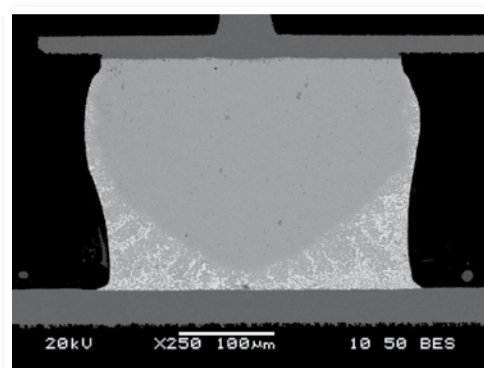


Comparison with Other Low Temperature Alloy

- No Hot Tearing
- Better Drop Test Performance
- Better Thermal Cycle Test Performance



No Hot Tearing

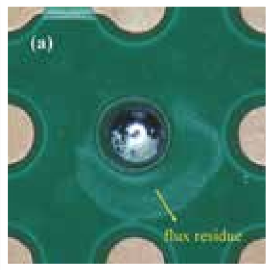


SHENMAO PQ10

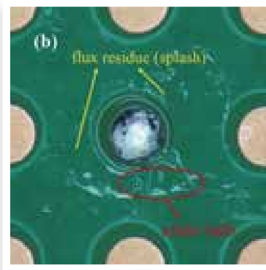
SHENMAO P133H
Laser Soldering Paste

- Applicable for Small SMD Components, Heat Sensitive Electronic Parts and Rework of BGA Components.
- Eliminated Warpage since No Laser Energy is Absorbed by PCB.

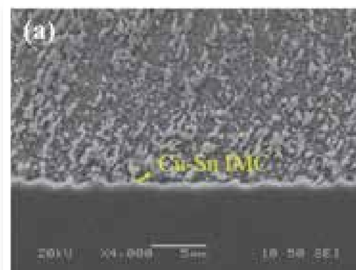
No Splash or Solder Balls

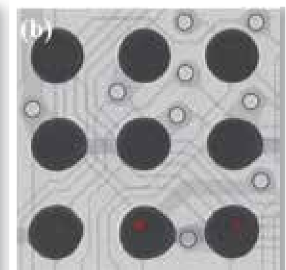


SHENMAO P133H



Conventional



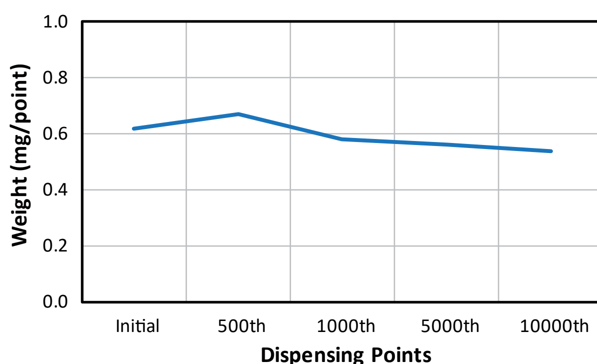


SHENMAO 203L
High-Pb Die Attach Solder Paste

Consistent Deposition in Continuous Dispensing Process without Less or Missing Solder

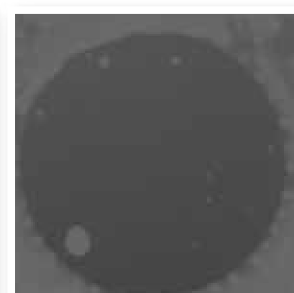
Initial	500 shots	1000 shots	5000 shots	10000 shots

Stable Dispensability on 10,000 Points



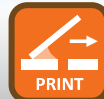
Outstanding Void Performance

Cu Surface



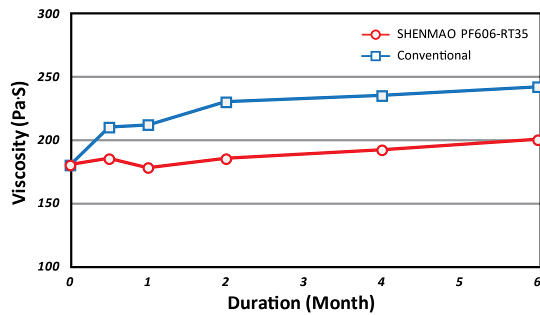
Sn Surface

SHENMAO RT35
Room Temperature Storable Solder Paste

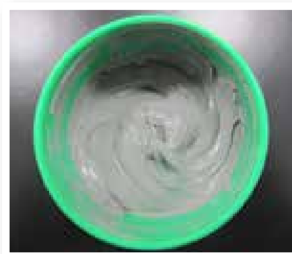


- No Refrigeration Required
- Storable at Room Temperature up to 35°C for Six Months

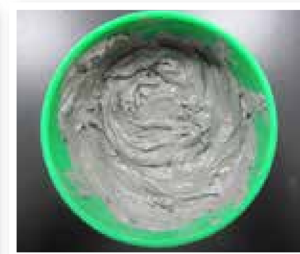
Life



Appearance

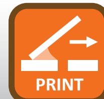


SHENMAO RT35



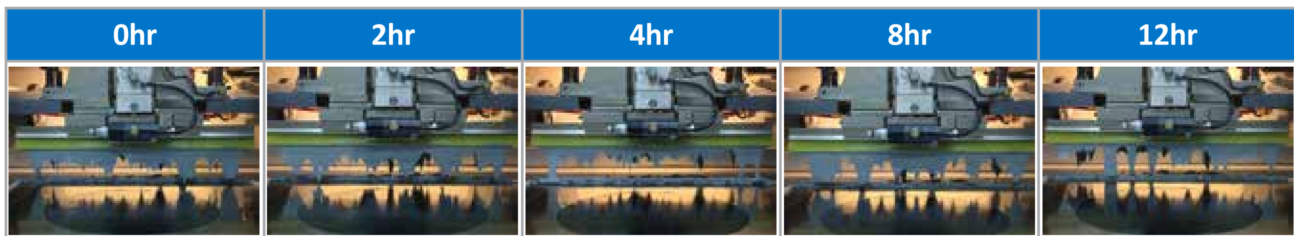
Conventional

SHENMAO PI-21
Bumping Paste



Printability

0hr	2hr	4hr	8hr	12hr

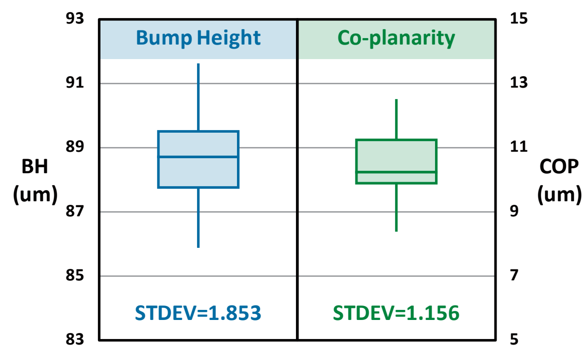


Voids

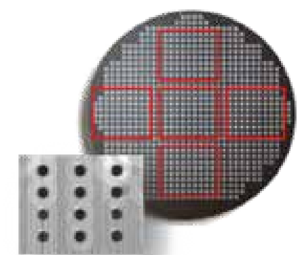
Wafer Type		Dummy
Paste		SHENMAO
Dry Film Opening (um)		150
Sampling Size		7500
FV Bump Void	>30%	0
	26~30%	4
	21~25%	10
	16~20%	16
	11~15%	9
Void Amount		39
Void Rate		0.52%

Bump Height & Co-planarity

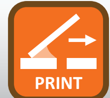
Criteria Bump Height: 85-100um
Co-planarity: <30um



*Average of 7500 Sampling Size

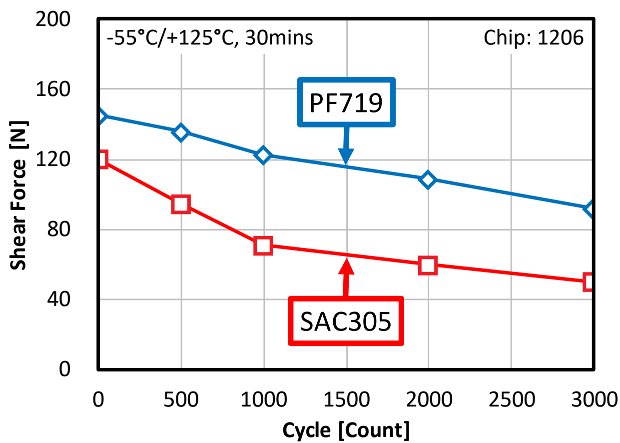


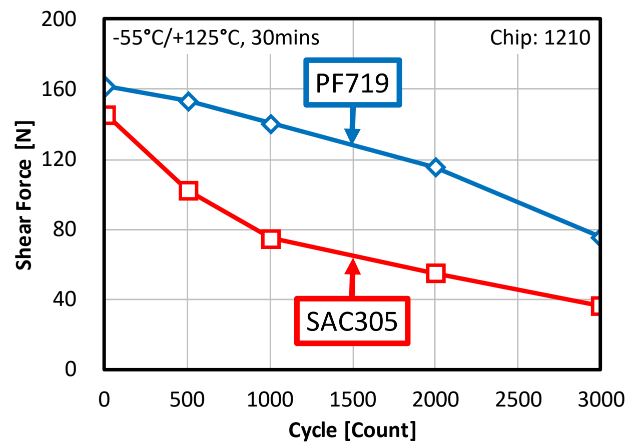
SHENMAO PF719-P250
High Reliability Solder Paste



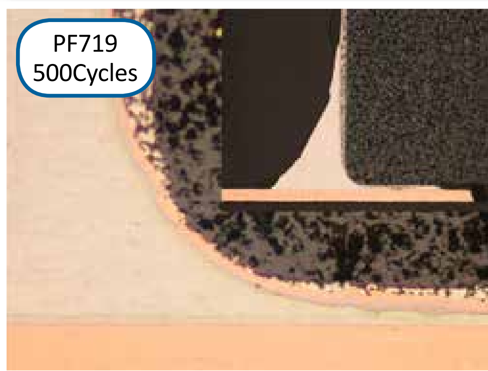
- Zero Halogen (No Halogen Intentionally Added)
- Excellent Voiding Performance
- Thermal Fatigue Resistance
- Usable in Critical Environment

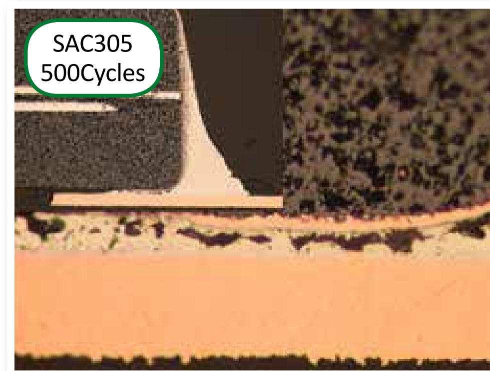
Mechanism for Thermal Fatigue Resistance





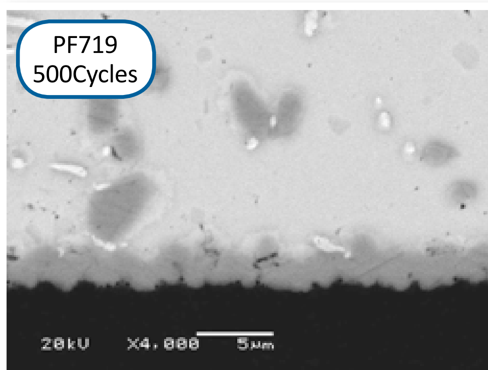
Prevent Crack Formation During Thermal Cycle

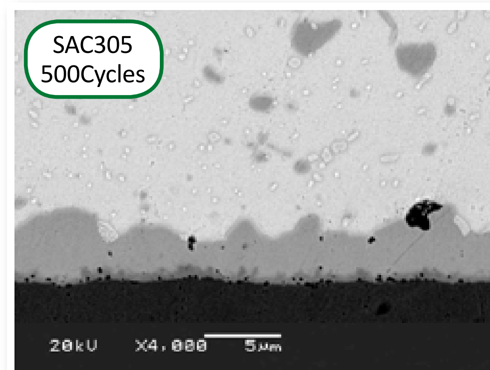




SHENMAO PF719-P250 Joint Strength is Improved

Mechanism for Thermal Fatigue Resistance





SHENMAO PF719-P250 IMC Growth is Suppressed

Solder Sphere

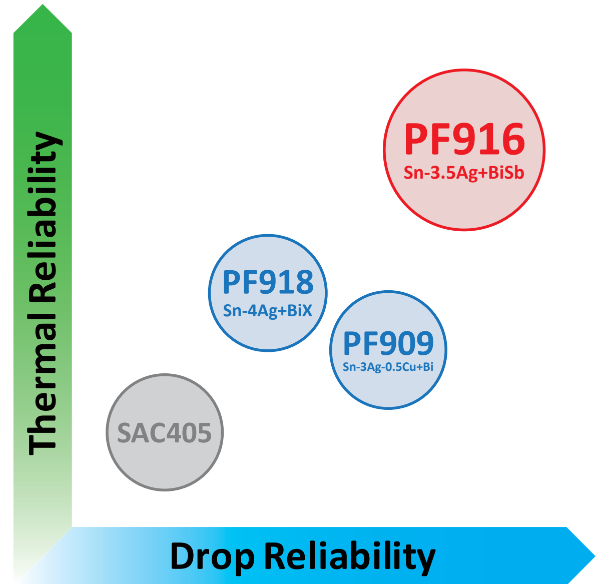
Solder Spheres with Various Alloy Compositions and Diameters

Alloy Series	Composition	
Sn-Ag-Cu	PF685	Sn-4Ag-0.5Cu
New Improvement ↑ Drop Reliability	PF909	Sn-3Ag-0.5Cu-Bi
New Improvement ↑ Drop/Thermal Reliability	PF916	Sn-3.5Ag-Bi-Sb
New Improvement ↑ Thermal Reliability	PF918	Sn-4.0Ag-Bi-X

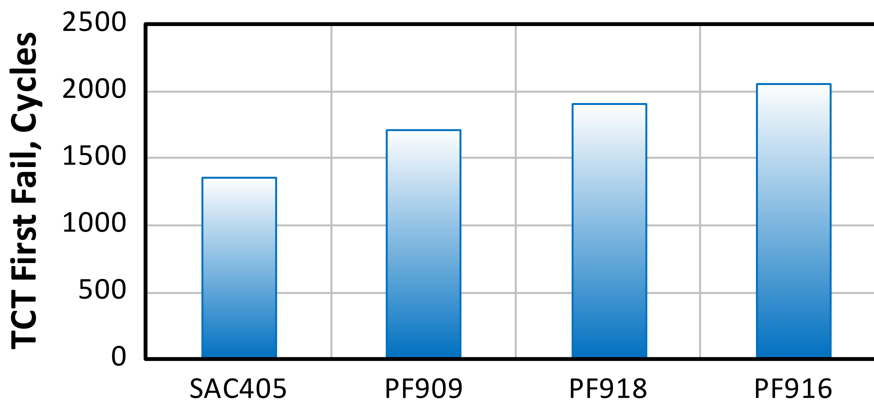
Level	Diameter (µm)	Tolerances (µm)
Solder Sphere	500~760	±20
	300~490	±10
	100~290	±5
Micro Solder Sphere	45~95	±3

SHENMAO Micro Solder Sphere 40µm Diameter are in Development

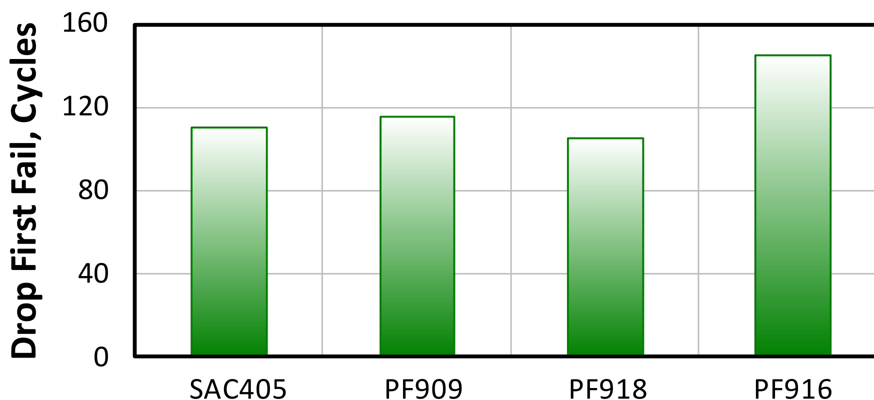
Product Guide



Board Level Thermal Cycle Test



Board Level Drop Test



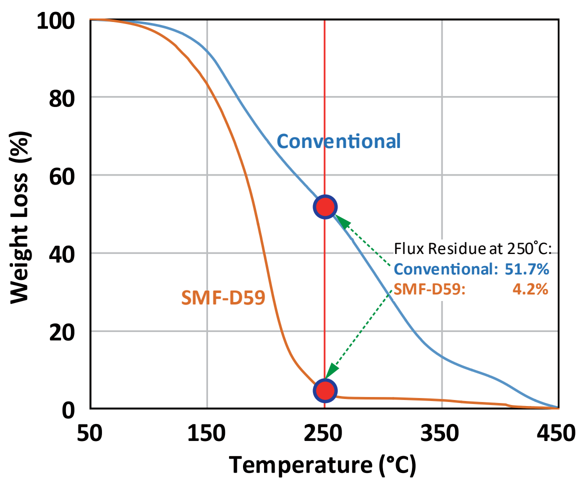
Flux for Semiconductor Packaging

SHENMAO SMF-D59
Low Residue Flip-chip Flux

- Designed for Flip-chip Dipping Applications
- Applicable for Fine-pitch Design
- Compatible with Underfills
- Low Residue

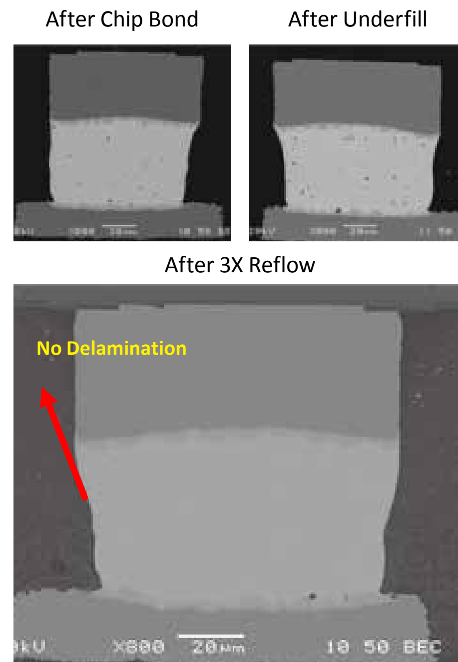
Flux Residue - TGA Analysis

**Condition: 40-450°C, 10°C/min*

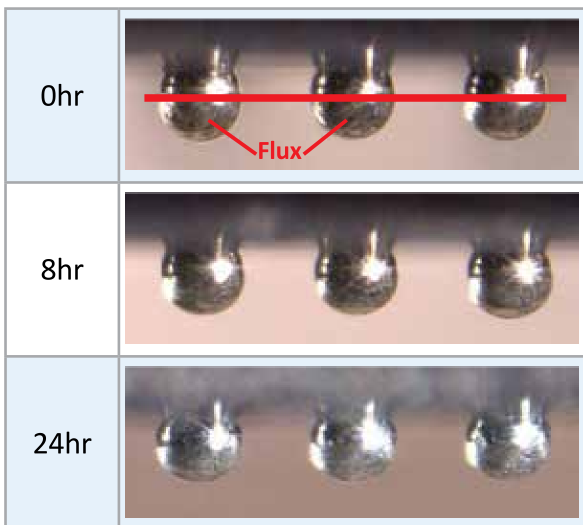


- Less Residue
- No Ceaning Needed Replace by Eliminated Clean Requirement

Compatibility Test

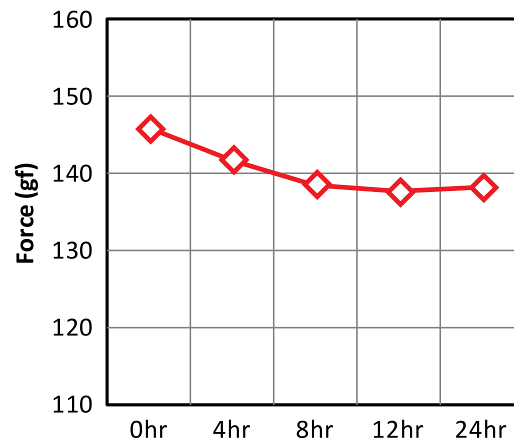


Dipping Performance



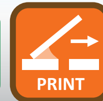
SMF-D59
Good Characteristic in Flux Dipping Stability

Tacky Force

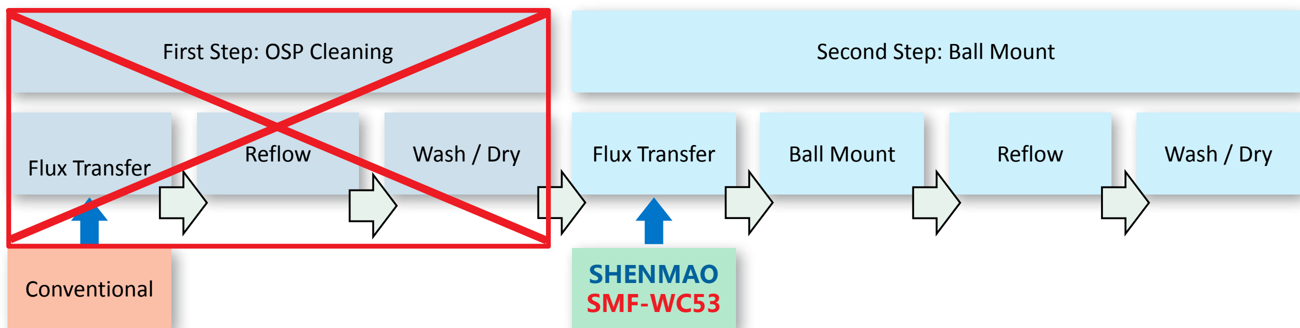


SMF-D59
High and Stable Tackiness

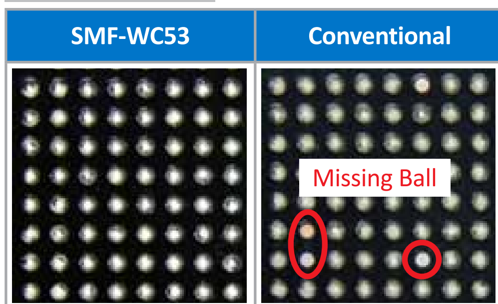
SHENMAO SMF-WC53
Cu-OSP Pad Ball Attach Flux



- Applicable for Printing or Pin Transfer
- Eliminated OSP Pre-clean Process
- Excellent Cleanability

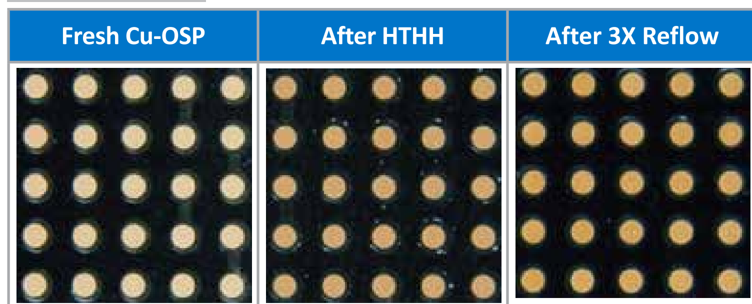


Solderability



Pad Condition: After 85°C/85%RH 240hrs

Cleanability

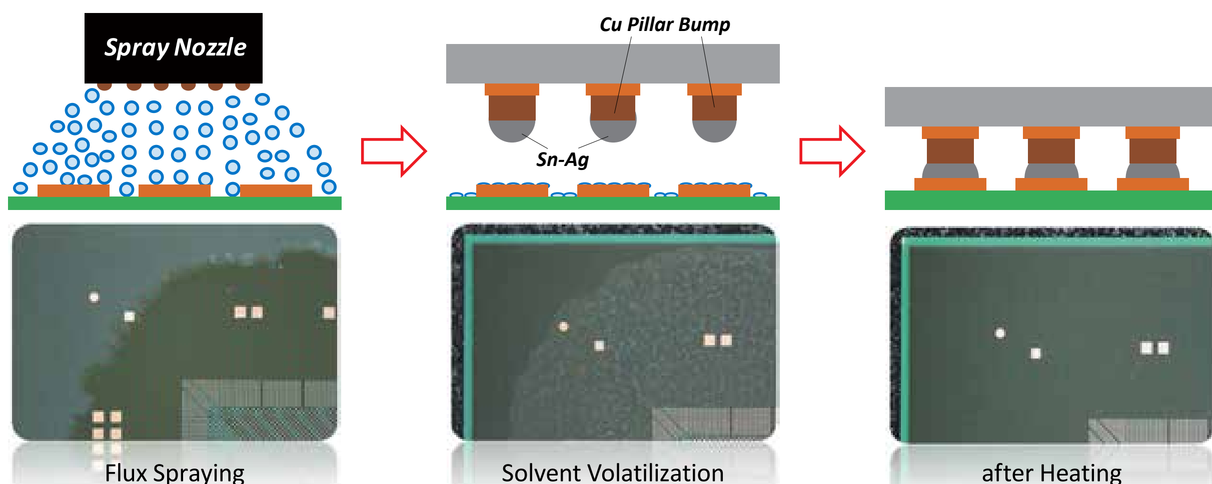


**HTHH: High Temp. High Humidity (85°C/85%RH for 240hrs)*

**Reflow: Peak Temp.240°C*

SHENMAO UL-51
Ultra Low Residue Spraying Flux

- Designed for Copper Pillar Bonding
- Superior Spraying Uniformity and Outstanding Soldering Performance with Ultra-low Flux Residue



Solder Wire

Product Guide

Flux	R	F4	F5	F7	F11	F13	F300	JF3	RWB	Test Method
Flux Content	3±1%									JIS-Z-3283
Diameters	0.3~3.0mm									---
Halide Content	<0.5%	ROL0 (J-STD-004)	<0.5%	<0.5%	<1.0%	ROL0 (J-STD-004)	ROM1 (J-STD-004)	<1.5%	<1.0%	JIS-Z-3197
Copper Plate Corrosion Test	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	IPC-TM-650, 2.6.15
Copper Mirror Test	PASS	PASS	PASS	PASS	PASS	PASS	PASS	---	PASS	IPC-TM-650, 2.3.32
Surface Insulation Resistance Test	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	IPC-TM-650, 2.6.3.3
Electrochemical Migration Test	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	IPC-TM-650, 2.6.14.1
Alloy	Compatible for all **SHENMAO** Lead-free Alloys									---
Remark	HP Approval	Halide-free, HP Approval	---	---	---	Halide-free	---	High Temp. Welding	---	---

Fuming Improvement

Reduce Smoke to Increase Operability and Enviromental Protection

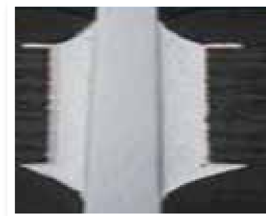
Evaluation Method

After 3 Seconds of Soldering at 380°C

Flux Residue

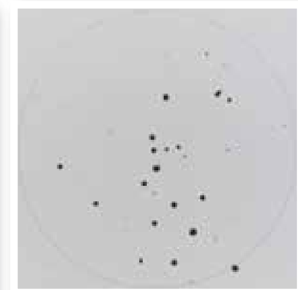
Soft Residues with Light Color after Soldering

Cross Section after Wire Soldering



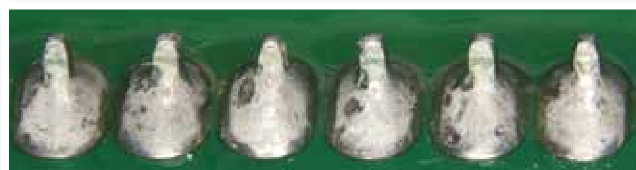
Lower Spattering

Improvement



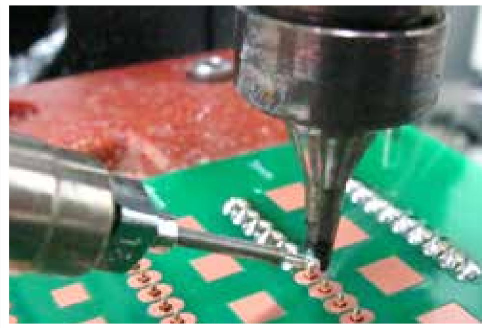
Conventional

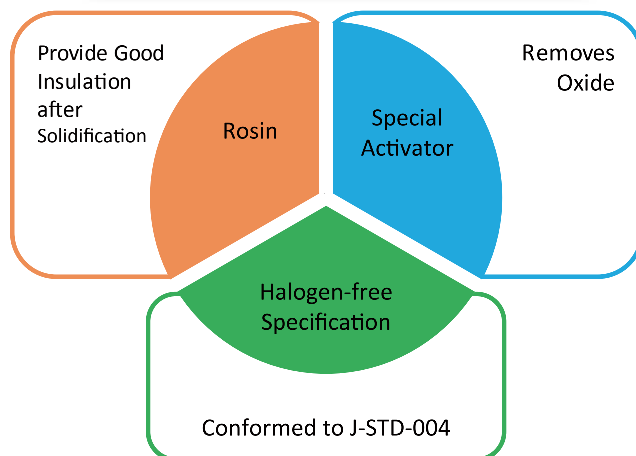
Good Wettability



SHENMAO F13
Solder Wire for Automatic Soldering Machine

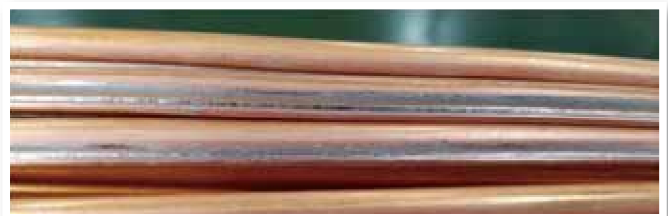
- Conformed to J-STD-004 (ROL0)
- Improved Work Environment
- Reduced the Technical Requirements
- Enhanced High Precision Soldering
- Stable and Extreme Soldering Quality
- Enhanced Soldering Efficiency
- Designed for Mass Production





SHENMAO JF3
Air-con. Brass Flame Welding Solder Wire

- Good Thermal Endurance
- Good Solderability
- Less Smoke
- Low Spatter
- Good Reliability



Spattering Test

Direct Heating Solder Wire under 800°C

Heating Method

SHENMAO JF3

Conventional

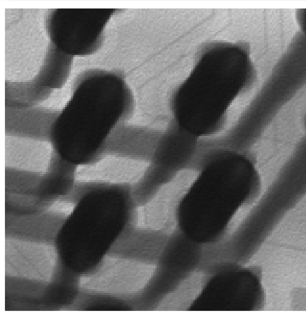
Liquid Flux

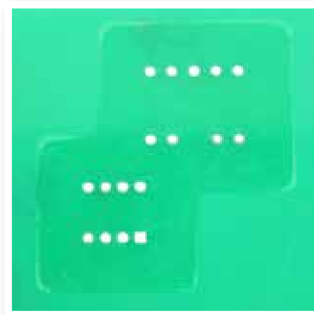
Product Guide

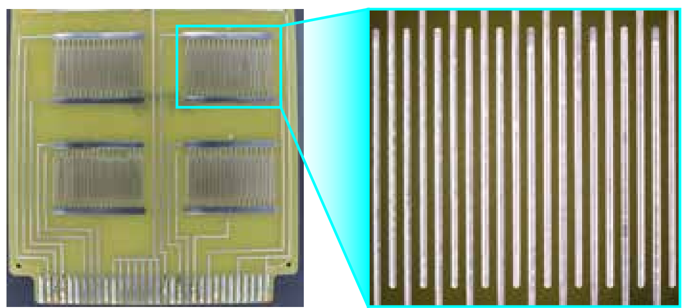
Flux	Solid Content (%)	Specific Gravity (25°C)	Acid Value (mg KOH/g)	Flux Type
SM-717	4.5±0.8	0.800±0.015	24.5 ± 7.0	ROL1
SM-727	5.8±0.7	0.807±0.015	37.0 ± 8.0	ROL0
SM-816	3.4±0.5	0.806±0.012	20.0 ± 5.0	ROL1
SM-816-V	4.2±0.7	0.800±0.015	23.0 ± 6.0	ROL1
SM-818	3.6±0.7	0.795±0.012	18.0 ± 7.0	Cl: <900 ppm Br: <900 ppm Cl+Br: <1500 ppm
SM-819	4.1±0.6	0.798 ± 0.01	21.0 ± 6.0	
SM-827	7.0±0.9	0.807±0.012	28.0 ± 6.5	
SM-857	5.5±0.6	0.805±0.012	28.5 ± 7.0	ROL1
SM-862	5.3±0.6	0.796±0.012	27.0 ± 6.0	ROL0
SM-863	3.0±0.5	0.796±0.012	21.0 ± 5.0	ROL0

SHENMAO SM-862
Lead-Free Liquid Flux

- Halogen-Free (ROL0)
- Excellent Wettability
- Flux Residue Resistant to High Voltage


Excellent Solderability


Little On-Board Residue


No Electrochimical Migration

Award Winning

- 2019 NPI Award
- 2018 Global Technology Award
- 2018 Mexico Technology Award

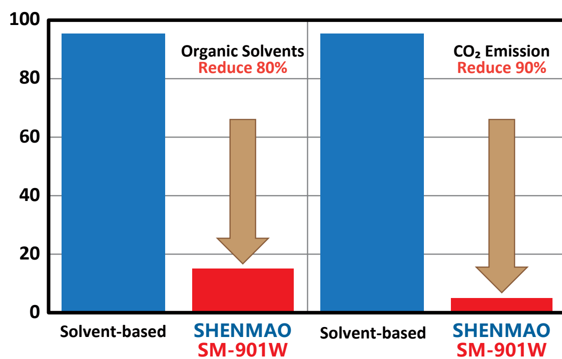
SHENMAO
Water-based Liquid Flux

Specification

Flux	Solid Content (%)	Specific Gravity (25°C)	Acid Value (mg KOH/g)
SM-901W	5.5 ± 0.7	1.02 ± 0.02	40.0 ± 5.0
SM-902W	4.3 ± 0.7	1.00 ± 0.02	40.0 ± 8.0

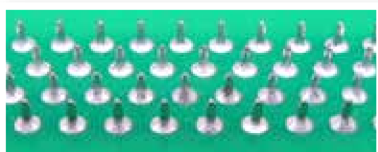
Advantages

- Reduced Cost
  - Reduced Transport Cost
  - Reduced Storage Cost
- Safety
  - No Toxic Substance
  - Easier Waste Disposal

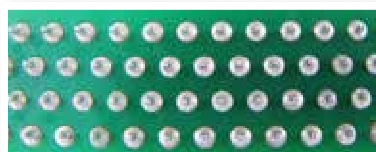


Water-based

Solvent-based



Excellent Solderability



No Bridge

No Residue

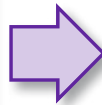
Water-based Cleaner

SHENMAO SMCW-1
Water-based Cleaner for Wave Soldering Fixture

- Applicable for Fixture Cleaning
- Can be Used with Brush or Ultrasonic Cleaner
- Environmentally Friendly
- Alternative for Solvent-based Cleaner

Application Procedure

Soften and Cleaned the Residue

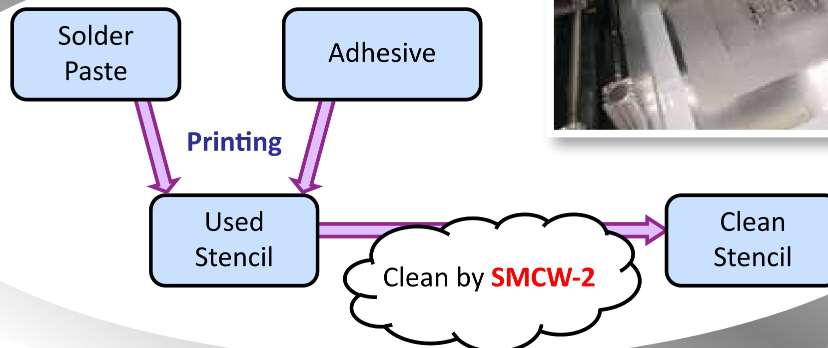


Fixture is Cleaned and No Residue

SHENMAO SMCW-2
Water-based Cleaner for Adhesive Printing Stencil

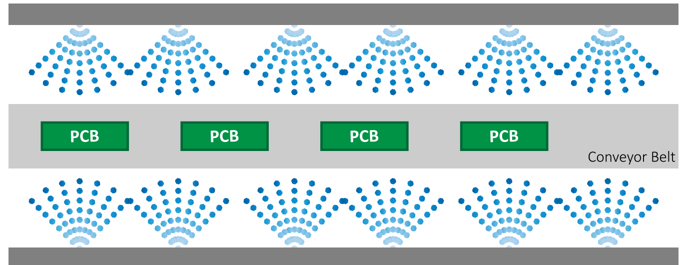
- Contained High Boiling Point Solvent, Designed to Clean Equipment
- Good Cleaning Ability to Stencil which Printed Solder Paste or Adhesive

Cleaning Application

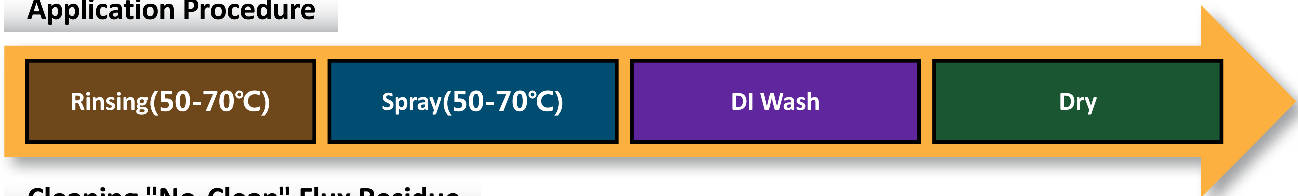


SHENMAO SMCW-3
Water-based Cleaner for PCBA

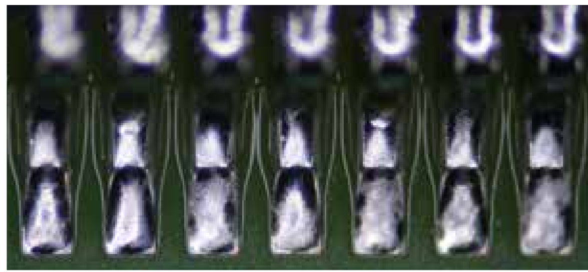
- Dissolve PCBA and BGA Flux Residue Rapidly
- No Corrosion after Cleaning
- No Ion Residue after Cleaning

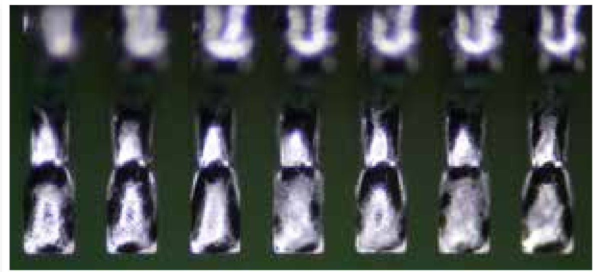


Application Procedure



Cleaning "No-Clean" Flux Residue


Before Cleaning


After Cleaning

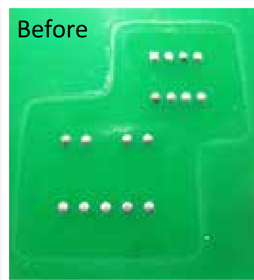
Solvent-based Cleaner

Product Guide

Cleaner	SMC-11	SMC-12	SMC-15
Specific Gravity (25°C)	0.755±0.09	0.741±0.09	0.77±0.02
Halogen Content	Halogen-free	Halogen-free	Halogen-free
Applicable Object	Flux residue, Stencil, Chain, Fixture	PCBA	Glass

Application

Stencil Cleaning (SMC-11)



Flux Residue Cleaning (SMC-12)

Glass Cleaning (SMC-15)

Solder Preform

Solder Preforms in Various Alloys and Forms

Regular Solder Preforms

Increment in solder volume accurately increasing component reliability and solder joint strength.

Sheetlike Solder Preforms

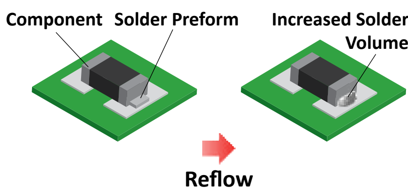
The surface flatness ensures high yield rates and stability in the IC packaging process, especially in die attachment.

Customized Solder Preforms

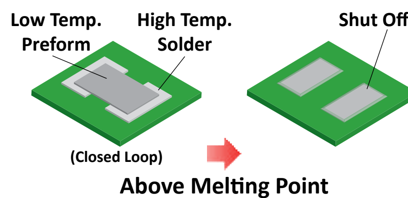
The preforms can be manufactured in various solder alloys and forms according to your needs.

Applications of Solder Preforms

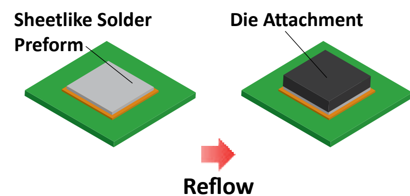
Increase Solder Volume



Fuse



Die Attachment



Specification

Spec	Size (mm)			Volume (mm^3)	Packaging Quantity (7" Reel)
	Length	Width	Thickness		
0201	0.51	0.25	0.25	0.03	10,000
03015	0.64	0.34	0.34	0.07	10,000
0402	1.00	0.50	0.50	0.25	5,000
0603	1.60	0.80	0.80	1.02	4,000
0805	2.01	1.30	0.76	1.98	3,000

Solder Bar

Anti-copper Erosion Solder Bar

Anti copper erosion solder material used to prevent the break of thin wire during dipping process.

Product Series	Alloy	Composition	Dipping Temperature
UHT-CR Series	**PF731**	Sn-3Cu-0.2Ni-X	390~500°C
	PF732	Sn-5Cu-0.2Ni-X	

**PF731 and PF732 are protected by patents.*

Low Dross

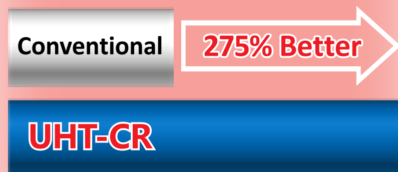
Reduce Solder Material Usage
Better Operability

Anti-oxidation

Bright and Clean Liquid Surface
Excellent Dipping and Soldering

Anti Cu-erosion

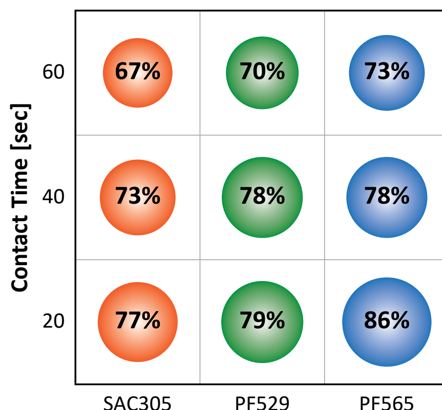
Increase Operation Time
Prevent Break of Thin Cu Wire



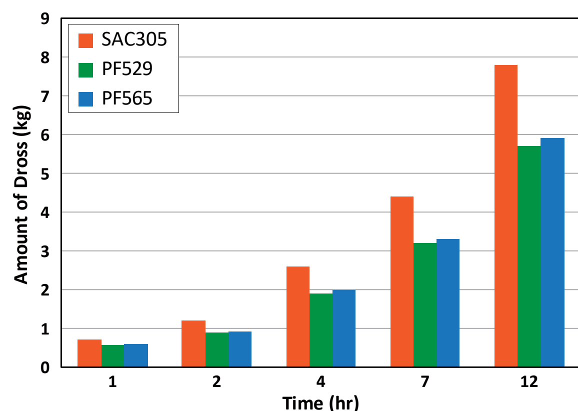
Low-Ag High Performance Solder Bar

Conventional High-Ag Product	Shenmao Low-Ag High Performance Product	
SAC305	**PF529** Sn-0.3Ag-0.7Cu-X	**PF565** Sn-0.05Ag-0.7Cu-X
Good Properties High Cost	Improved Anti-copper Erosion Performance by Adding Ni Element Lowered Dross Rate by Adding Ge Element	

Copper Erosion Prevention



Reduced Dross

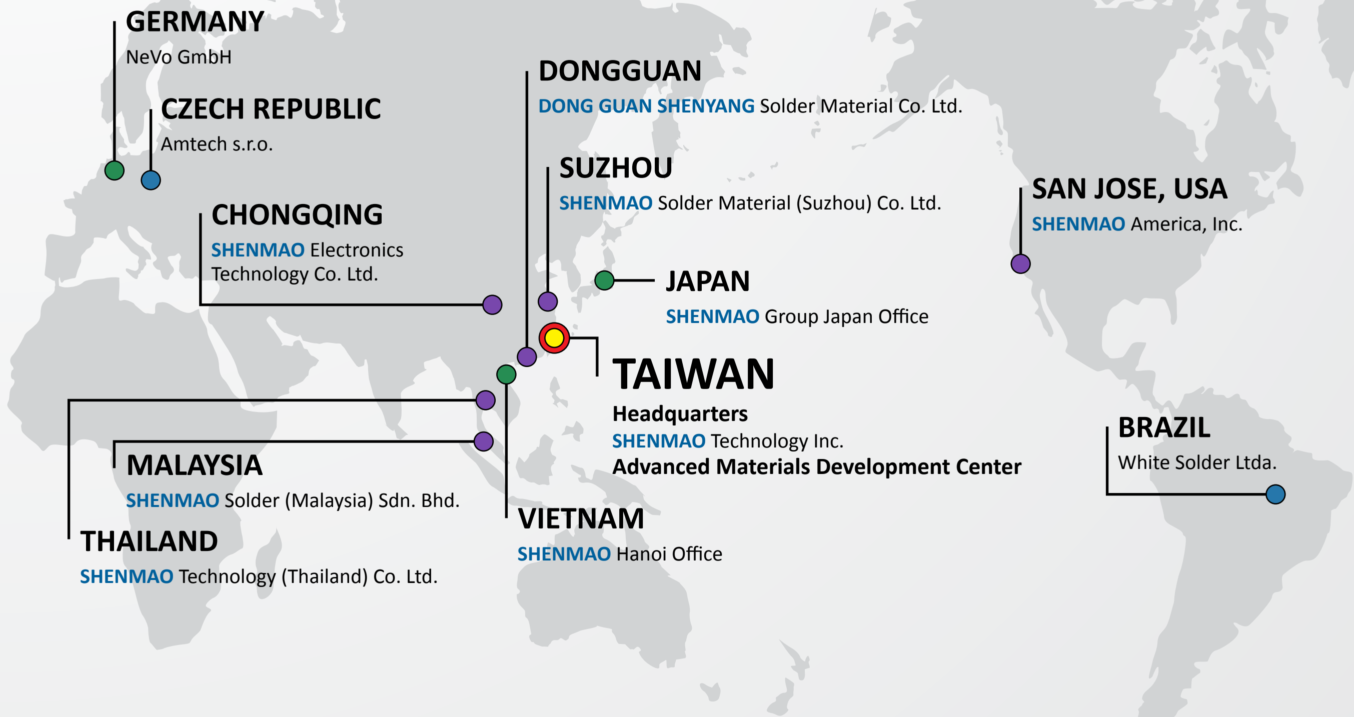


Main SHENMAO Alloys

Alloy	Composition	Melting Point (°C)	Forms			
			Bar	Wire	Paste	Preform
SnAgCu Series						
PF606	Sn-3Ag-0.5Cu-X	217~219	●	●	●	●
PF629	Sn-0.3Ag-0.7Cu	217~226	●	●	●	●
PF632	Sn-1Ag-0.5Cu	217~226	●	-	●	●
SnCu Series						
PF604	Sn-0.7Cu	227~228	●	●	●	●
PF643	Sn-0.7Cu-0.04Ni	227~228	●	●	-	●
PF565	Sn-0.05Ag-0.7Cu-X	227~228	●	-	●	●
PF731	Sn-3Cu-0.2Ni-X	227~340	●	-	-	-
PF732	Sn-5Cu-0.2Ni-X	227~370	●	-	-	-
SnAg Series						
PF616	Sn-4Ag	221~225	●	-	●	●
Pure Sn Series						
PF605	Sn99.99	232	●	-	●	●
Lead Containing Series						
SH63	Sn-37Pb	183	●	●	●	●
SH62	Sn-36Pb-2Ag	179	●	●	●	●
SH-0595	Sn-95Pb	308~312	●	●	●	●
SH-05X25	Sn-92.5Pb-2.5Ag	299~307	●	●	●	●
SH-10882	Sn-88Pb-2Ag	268~290	●	●	●	●
Low Temperature Series						
PF602	Sn-58Bi	139	●	●	●	●
PF653	Sn-57Bi-1Ag	137~142	●	-	●	●
PF676	Sn-57.6Bi-0.4Ag	137~142	●	-	●	●
PF713	Sn-17Bi-0.5Cu	184~209	-	-	●	-
PF714	Sn-35Bi-1Ag	138~187	-	-	●	-
PF734	Sn-40Bi-1Ag-X	137~170	-	-	●	-
PF735	Sn-57Bi-1Ag-X	137~142	●	●	●	-
PF743	Sn-48Bi-1Ag-X	137~155	-	-	●	-
SnSb Series						
PF623	Sn-5Sb	238~241	●	-	●	●
PF725	Sn-10Sb	245~266	●	-	●	●
PF719	Sn-3.9Ag-0.6Cu-3Sb	220~227	●	-	●	-

Alloy	Composition	Melting Point (°C)	Sphere
BGA Series			
PF682	Sn-1.2Ag-0.5Cu-Ni	217~227	●
PF683	Sn-1Ag-0.5Cu	217~227	●
PF684	Sn-3Ag-0.5Cu	217~219	●
PF685	Sn-4Ag-0.5Cu	217~219	●
PF687	Sn-3.5Ag	220~222	●
PF698	Sn-2.6Ag-0.6Cu	217~219	●
PF908	Sn	230~233	●
PF909	Sn-3Ag-0.5Cu-Bi	210~217	●
PF912	Sn-2Ag-0.5Cu-Bi	210~225	●
PF916	Sn-3.5Ag-Bi-Sb	210~225	●
PF918	Sn-4Ag-Bi-X	210~217	●
PF623	Sn-5Sb	238~241	●
Low Temperature BGA Series			
PF602	Sn-58Bi	139	●
PF653	Sn-57Bi-1Ag	137~142	●
PF676	Sn-57.6Bi-0.4Ag	137~142	●
PF713	Sn-17Bi-0.5Cu	184~209	●
PF714	Sn-35Bi-1Ag	138~187	●
PF734	Sn-40Bi-1Ag-X	137~170	●
PF735	Sn-57Bi-1Ag-X	137~142	●
PF743	Sn-48Bi-1Ag-X	137~155	●

Global Directory



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● Collaboration Partner w/ Manufacturing Plant

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