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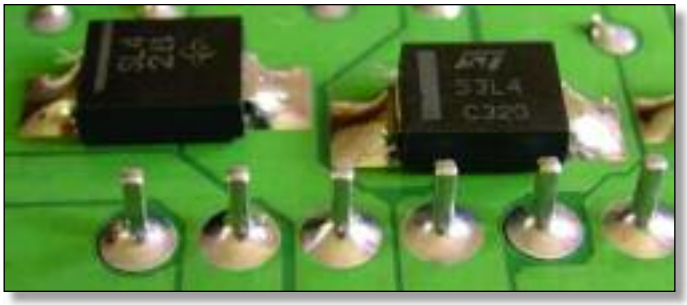
SN100C

Lead-Free Solder Alloy

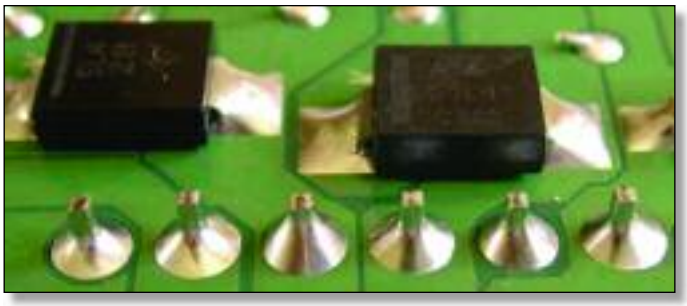
The Best Choice for Lead-Free Wave Soldering

SN100C is a lead-free solder alloy developed by Nihon Superior in Japan comprised of tin, copper, and a small amount of nickel + germanium. SN100C offers user-friendly properties and has been proven in commercial production for over six years.

The result of these advantages is that SN100C offers high-throughput and the lowest cost of ownership as compared to any other lead-free solder alloy.



Sn-37Pb



SN100C

Developed by

NIHON SUPERIOR

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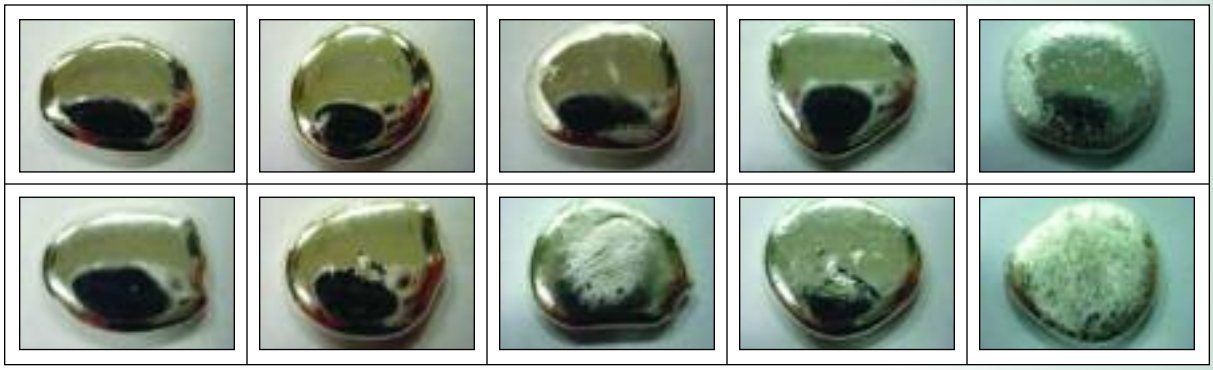
SN100C At A Glance

- Does not contain silver or bismuth.
- Eutectic alloy.
- Bridge-free and icicle-free soldering.
- Smooth, bright, well-formed fillets, free of gross micro-cracks, irrespective of the cooling rate.
- Good through-hole penetration.
- Good topside fillet formation.
- Dross rate equal or lower than tin-lead solder.
- Does not require a nitrogen atmosphere.
- Does not erode copper from holes, pads and tracks.
- Low rate of copper leaching makes it easy to control the copper content of the solder bath.
- Lower aggressiveness to stainless steel and other solder pot materials as compared to tin-silver-copper alloys.
- Thermal fatigue resistance and creep strength better than tin-lead.
- Slow, even growth of the intermetallic layer at the solder/substrate interface.
- Also performs well in selective and dip soldering.

The Bottom Line

Customer experience over several years is that the TOTAL cost of running a standard wave soldering machine with SN100C when all factors are taken into account can be up to **one third the cost** of running the same machine with tin-silver-copper alloys. The actual savings in each case will depend on the number of factors that apply, but the cost of running a line with SN100C is *always lower* than the cost of running the same line with tin-silver-copper.
Please contact AIM for additional information.

SN100C Solder Surface Comparison



Rapid Cooling

Slow Cooling

Sn63/Pb37 | SN100C | Sn99.3/Cu0.7 | Sn/Ag3.8/Cu0.1 | Sn/Ag3/Cu0.5 (SAC305)

Vibration Testing

Testing by JCAA/JG-PP has determined that SN100C is superior to SAC alloy and tinlead for vibration testing when combined with a NiPdAu or tin part finish. Additional information on this testing may be found in *"JCAA/JG-PP No-Lead Solder Project: Vibration Test"* by Thomas A. Woodrow of Boeing Phantom Works.

Alloy Compatibility

Testing has demonstrated that no degradation occurs when mixing SN100C with tinsilver- copper or other lead-free alloys. Therefore, it is acceptable to utilize SN100C for wave soldering and SAC305 for SMT without compromising reliability. Furthermore, no reliability degradation is found when using SN100C wire to touch up SAC305 solder joints and vice versa. Please contact AIM or visit www.leadfree.com for a full report on this issue.

Availability

- Bar Solder
- Wire Solder
- Solder Bath Top-Off Alloy (SN100Ce)
- Other forms such as Solder Paste, Spheres, and Preforms.

SN100C Specifications

Material Property		SN100C			Test method
Melting Temperature [°C]		Solidus 227			Ramp rate for different thermal analysis 20°/min
		Liquidus 227			
S.G.		7.4			S.G. measuring apparatus 25°
Specific Heat [J/Kg·K]		220			Estimated value
Thermal conductivity [J/m·s·K]		64			Estimated value
Vickers Hardness	Slow cooling	16.1			Cast onto alumina plate
	Fast cooling	12.9			Cast onto insulating brick
Tensile strength [M·Pa]		32			10mm/min. (25°)
Elongation [%]		48			10mm/min. (25°)
Electrical resistance [μΩm]		0.13			For Terminal method (25°)
Coefficient of Thermal Expansion	30-80°	1.33×10^{-3}			Conditions: Load: 10.0grams, sample; Almina (20mm), Programmed temperature: 10°/min.
	80-130°	1.38×10^{-3}			
	130-180°	1.46×10^{-3}			
Spread Factor %	240°	77			JIS Z 3197
	250°	77			
	260°	78			
	280°	78			
Creep Strength (Time to Failure)	145°	>300 hours			145° load 1 kg
	150°	>300 hours			150° load 1 kg
	180°	>300 hours			180° load 1 kg
Wettability (Seconds)		Ta	Tb	Fmax	Wetting Balance 0.3 x 3.5 x 25 mm Ta = Zero cross time Tb = Wetting time Fmax = Max. wetting force
	240°	1.0	4.53	0.159	
	250°	0.86	2.79	0.181	
	260°	0.47	1.46	0.186	
	270°	0.31	0.8	0.192	
Copper erosion rate at 260°		~ 2 minutes			Time for complete erosion of 0.18mmϕ wire
Thermal shock		>1,000 cycles			-40/+80° each 1hr
Electromigration		>1,000 hrs			40° 95%RH & 85° 85%RH
Whiskers		>1,000 hrs			50°

Alloy Compatibility Test Data Before and After Thermal Cycling

Alloy	0 cycles	1000 cycles
SAC305	15.3 lbs	15 lbs
SN100C + SAC mix	14.1 lbs	14.3 lbs
SN100C	14.2 lbs	14.0 lbs
Sn/Pb	14.8 lbs	14.5 lbs

Results show that solder joints made with SAC, SN100C and the SN100C + SAC mixture are all comparable to tin-lead solder joints made on the same board. In addition, it was determined that thermal cycling does not seem to degrade these solder joints.

Wave Soldering with SN100C Recommendations

Preheat	Solder Wave	Dwell Time
100-115°C	260-270°C	5 seconds minimum

Successfully Tried and Tested

Leading electronics manufacturers throughout the world have used SN100C with outstanding results since 1999. To date, millions of circuit boards have been assembled with the SN100C family of solders in all types of products. Many of the devices soldered with SN100C already have been in use for several years.

Seamless Changeover

AIM has already helped multitudes of manufacturers implement lead-free soldering, and we invite you to benefit from our expertise. Our services include process audits, solder pot analyses, and on-going applications support. The issue of lead-free soldering can be complex. We are here to help you from changeover right through to optimization.

AIM Manufacturing Facilities Around the World

Please visit

www.aimsolder.com/SN100C.cfm

for additional technical information.

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