

SN100C Nihon Superior Lead Free Bar

GENERAL DESCRIPTION

FCT Assembly has partnered with Nihon Superior to be able to offer their patented lead free nickel stabilized tin/copper wave solder alloy – SN100C in North America. SN100C was developed to offer a technically superior and more economical option to the tin-silver-copper alloys also being considered. SN100C is also significantly less costly than other tin alloys including SAC305.

With over 3000 lines in commercial production, some for over twelve years, and more than 1.5 billion boards in service, SN100C gives you the confidence that switching to lead free does not have to be difficult.

The patented addition of nickel to the tin-copper eutectic offers the following advantages:

- Bridge-free wave soldering at 250°C-260°C
- No shorts on QFP to 0.65mm, 100 pins
- Smooth, bright fillets
- Good penetration of through holes
- Can be used in air
- Does not require special solder pots
- Easy to manage in the solder pot
- Lower cost than silver containing lead free alloys
- Lower drossing than other lead free alloys
- Solder Pot Analysis Program

CHARACTERISTIC	SN100C	SN/.7CU	SAC405 (SN/4AG/.5CU)	SAC305 (SN/3AG/.5CU)	SACX0307 (SN/0.3AG/.7CU/BI)
Smooth, Shiny Joint?	YES	NO	NO	NO	NO
Reactivity to Equipment	LOW	HIGH	HIGH	HIGH	HIGH
Eutectic? (Paste Range)	YES	YES	YES	NO (4°C)	NO (10°C to 11°C)
Contains Bismuth?	NO	NO	NO	NO	YES
Easy Pot Management?	YES	NO	NO	NO	NO
Low Cost?	YES	YES	NO	NO	YES
Low Drossing?	YES	NO	NO	NO	NO

APPLICATIONS

PRODUCT NAME	APPLICATION	MELTING POINT (°C)
SN100C	Wave Soldering, Manual Rework, Dip Soldering, Reflow Soldering	227
SN100Ce	SN100C Bath Maintenance	227-230
SN100CL	Hot Air Solder Level (HASL)	227
SN100CLe	SN100CL Bath Maintenance	227-230
SN100C3	High Temperature Tinning and Dip Soldering	227-310
SN100C4	High Temperature Tinning and Dip Soldering	227-340

TECHNICAL SPECIFICATIONS

TEST	SOLDER ALLOY									TEST METHOD	
Name	SN96CI			SN100C			SN63				
Alloy System	Sn-Ag-Cu			Sn-Cu+Ni			Sn-Pb				
Melting Temperature °C	217			227			183			DSC	
Specific Gravity	7.5			7.4			8.4			S.G. Measuring Apparatus	
Specific Heat (J/kg*K)	220			220			176			Estimated	
Thermal Conductivity (J/m*s*K)	64			64			50			Estimated	
Tensile Strength (M*Pa)	52			32			44			10mm/min (25°C)	
Elongation (%)	27			48			25			10mm/min (25°C)	
Spread Factor (%)	230°C	77			-			91			JIS Z 3197 (NS-828A FLUX)
	240°C	77			77			92			
	250°C	77			77			93			
	260°C	78			78			93			
	280°C	-			78			-			
Wettability		Ta	Tb	Fmax	Ta	Tb	Fmax	Ta	Tb	Fmax	Wetting Balance 0.3x3.5x25mm Copper Test Piece Ta-Zero Cross Time Tb-Wetting Time Force
	240°C	0.72	2.10	0.213	1.0	4.53	0.159	0.12	0.80	0.195	
	250°C	0.37	1.46	0.213	0.86	2.79	0.181	0.11	0.64	0.200	
	260°C	0.23	0.81	0.192	0.47	1.46	0.186	0.10	0.41	0.206	
270°C	0.21	0.48	0.192	0.31	0.8	0.192	0.07	0.31	0.211		
Electrical Resistance (μΩm)	0.15			0.13			0.17			Four Terminal Method	
Copper Erosion Rate At 260°C	Approx. 2 minutes			Approx. 2 minutes			Approx. 1 minute			Time for Complete Erosion of 1.8mm Dia. Wire	
Creep Strength (Time to Failure)	> 300 HRS			> 300 HRS			20 HRS			145°C, 1KG Load	
	> 300 HRS			> 300 HRS			3 HRS			150°C, 1KG Load	
	> 300 HRS			> 300 HRS			7 MIN			180°C, 1KG Load	
THERMAL SHOCK	>1000 CYCLES			>1000 CYCLES			500-600 CYCLES			-40/+80°C Each 1 HR	
ELECTROMIGRATION	>1000 HRS			>1000 HRS			> 1000 HRS			40°C, 95%RH & 85°C, 85%RH	
WHISKER TEST	>1000 HRS			>1000 HRS			>1000 HRS			50°C	

SN100C lead free solder will perform equally well in automated wave soldering, reflow soldering (separate technical data available), selective soldering, and static solder pots. SN100C3 and SN100C4 have been specifically developed for high temperature dipping applications and can be used for tinning very fine copper wires at temperatures up to 400°C. SN100CL has been developed for use in lead free Hot Air Solder Level (HASL) equipment and provides a smooth bright finish with a solderable shelf life of over one year.

As the SN100C solder bath is used, copper tends to dissolve into the solder from the boards and component leads. If the copper content of the solder bath exceeds 0.85%, there is likely to be an increase in the incidence of bridges, icicles, and other defects. In order to maintain the proper copper level in the bath FCT Assembly offers the Nihon Superior SN100Ce as the top-up alloy. It has a lower copper content than the SN100C so that the copper content in the solder pot stays below the critical level of 0.85%. Verification of copper content is easy with the Solder Pot Analysis Program offered by FCT Assembly.

RECOMMENDED OPERATING PARAMETERS

One of the major differences between SN100C and standard SN63 is the difference between the processing temperature and the melting point of the alloys. Because the differences are much smaller with SN100C, care must be taken to ensure the process settings are optimized. Based on over twelve years of production on 3000+ wave solder machines, the following guidelines have been established:

- Control air drafts in machine
 - Close off openings
 - Adjust damper to reduce drafts
 - Minimize gap between preheaters and pot
 - Ensure cooling fans blow away from pot

- Ensure adequate preheat for board type as listed below:

P.C. Board Type	Recommended Preheat Temperature Range (°C)
Single-sided, Simple double-sided	90-100
Double-sided	100-115
Heavy double-sided, multilayer	120-130

- Ensure temperature in the wave meets requirements listed below

P.C. Board Type	Recommended Solder Pot Temperature Range (°C)
Single-sided, Simple double-sided	250-255
Double-sided	255-260
Heavy double-sided, multilayer	255-265

- Use fluxes that can withstand the preheat requirements, such as FCT Assembly's NC160 No Clean Flux or VOC503 VOC free flux.

PACKAGING

SN100C and SN100Ce are packaged in 25-pound boxes and each bar weighs approximately two pounds. Also available in a 8-pound bar which includes a handling hole for automatic solder feeds. Call for special requirements.

HEALTH AND SAFETY

Refer to the MSDS for guidance on safety and health issues.

