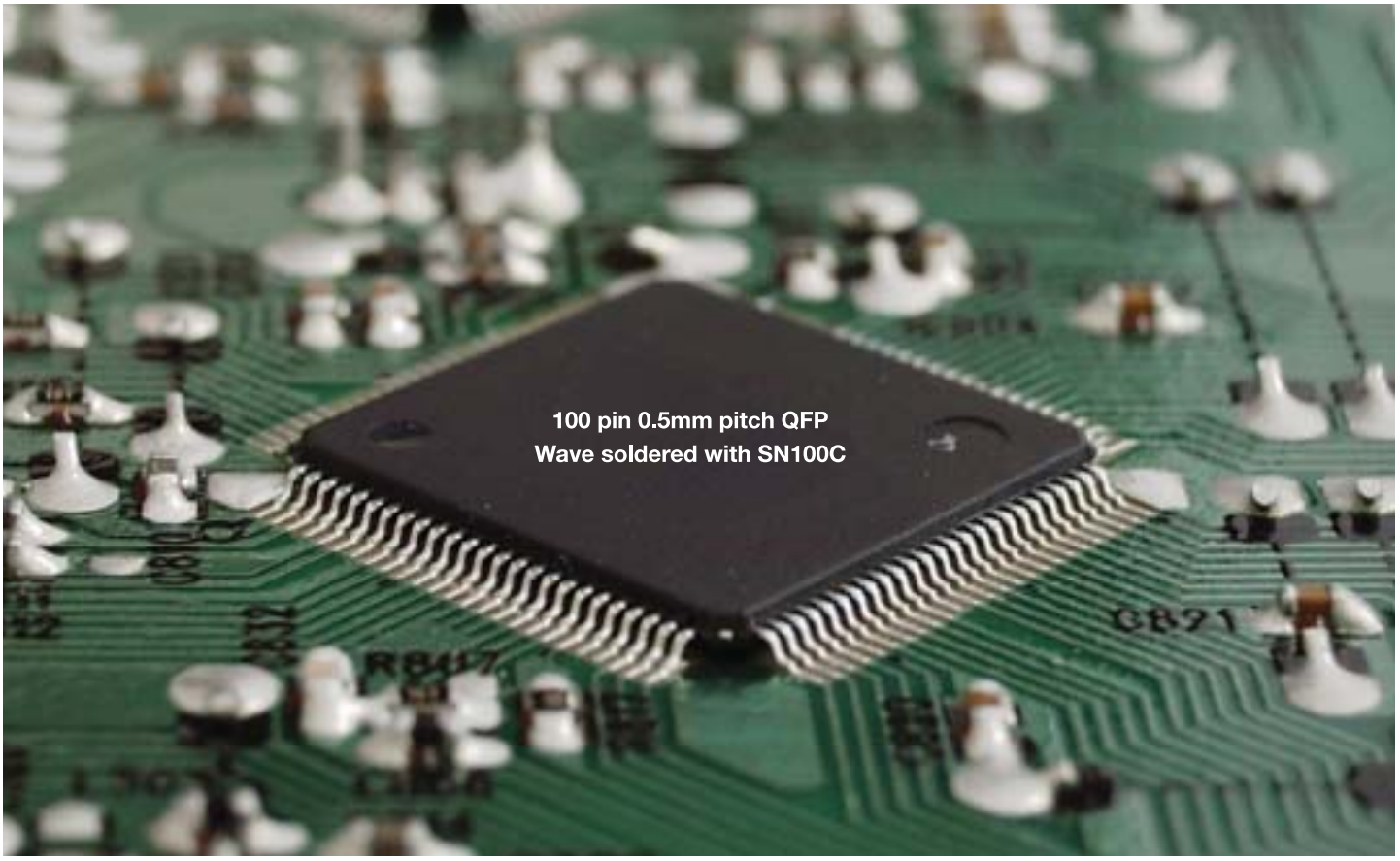
NSe LEAD FREE e-SOLDER

SN100C (Sn-Cu-Ni+Ge)

Effect of the addition of Nickel and Germanium

SN100C is a lead free solder that is composed of Sn (Tin)-Cu (Copper)-Ni (Nickel) and Ge (Germanium). Trace addition of Ni and Ge increases fluidity of solder, and it also improves wettability by reducing oxidization on the surface. Moreover with SN100C you can achieve bright and smooth fillets without shrink cracks to "hot tears."



100 pin 0.5mm pitch QFP
Wave soldered with SN100C

for Environmental Conservation

e ecology of the earth environment economically in electrical & electronic products for eternity

Nihon Superior is conscious of the need for our products to be compatible with the environment. Nihon Superior is also conscious of the customer's need for quality and reliability at a reasonable cost.
Our current range of products addresses those needs. We will undoubtedly commit ourselves to aiming for technical innovation.

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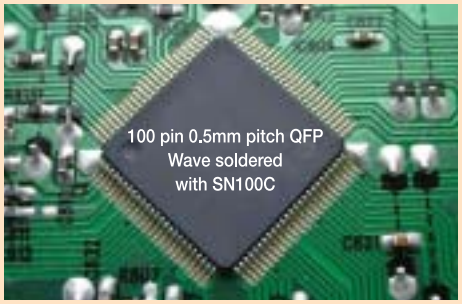
The Fluidity of Solder

[Example for the bridge reduction]



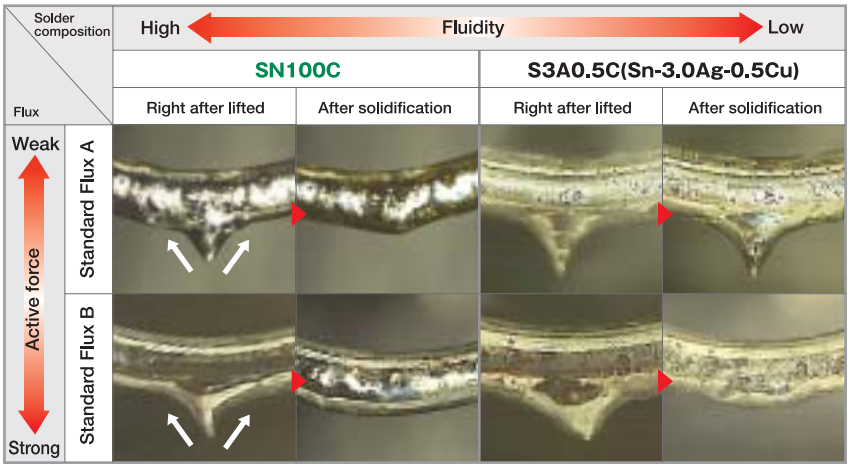
SN100C enables bridge–free soldering even in soldering 100 pin 0.5mm pitch QFP.

Icicle Test

As a result of having conducted Icicle test for the purpose of confirming the drainage characteristic of solder, it turns out that Sn-Cu-Ni family lead free solder has improved fluidity because of the effect from Ni.SN100C shows a superb performance in reducing icicle formation. Moreover SN100C is more effective in reducing bridging among Sn-Cu-Ni family. This demonstrates that SN100C is the best in the lead free alloys for reducing defects from bridging.

[Condition]
- Test piece : Oxygen free copper ring (Wire dia. 2.0 mm, Inside dia.20 mm)
- Used flux : JIS Standard flux A,B
- Melting temperature : 255℃
- Contact depth : 6 mm
- Contact speed : 4 mm/s
- Contact time : 20 sec.
- Lifting speed : 2 mm/s

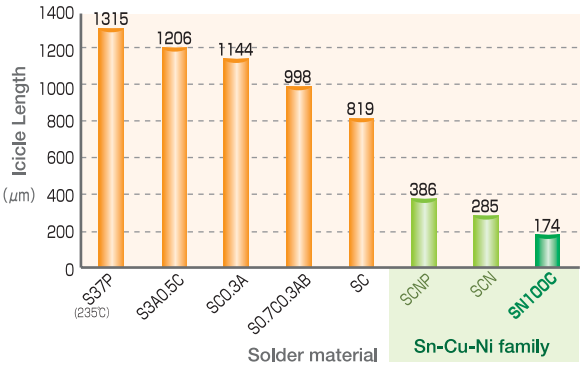
[Test piece : Oxygen free copper ring]



※ JIS Standard Flux A : Non-active rosin flux / JIS Standard Flux B : Halogen activated rosin flux

Icicle length of each lead free solder

JIS Standard Flux A



Shrinkage (Hot Tears)

SN100C prevents the occurrence of shrink related defects due to the influence of Nickel, and trace addition of Germanium enhances a bright and smooth finish of fillets.

[An example of shrinkage occurring]

Solder Alloy	Early stage	−40/+125℃ each 30min. after 1000 cycles
SN100C		
Sn-3.0Ag-0.5Cu		

[Pictures of solidified samples]

Solder Alloy	Whole surface	Image of magnified center	Cross section image of upper side
SN100C			
Sn-3.0Ag-0.5Cu			

Mechanism of occurrence

A nac High Speed Camera was used to film the process of solder solidifying from its liquid state to solidification studying the formation of shrink cavities “Hot Tears”. From the film we can identify the molten state (❶), formation of Intermetallic (❷), phase of primary tin crystal (❸) and after the super cooled eutectic solidification (❹), shrinkage occurs (❺).

❶ Liquid state
❷ Formation of intermetallic
❸ Formation of primary tin crystal
❹ Solidification of eutectic (Super cooled melting point)
❺ Shrinkage after solidification

Wettability

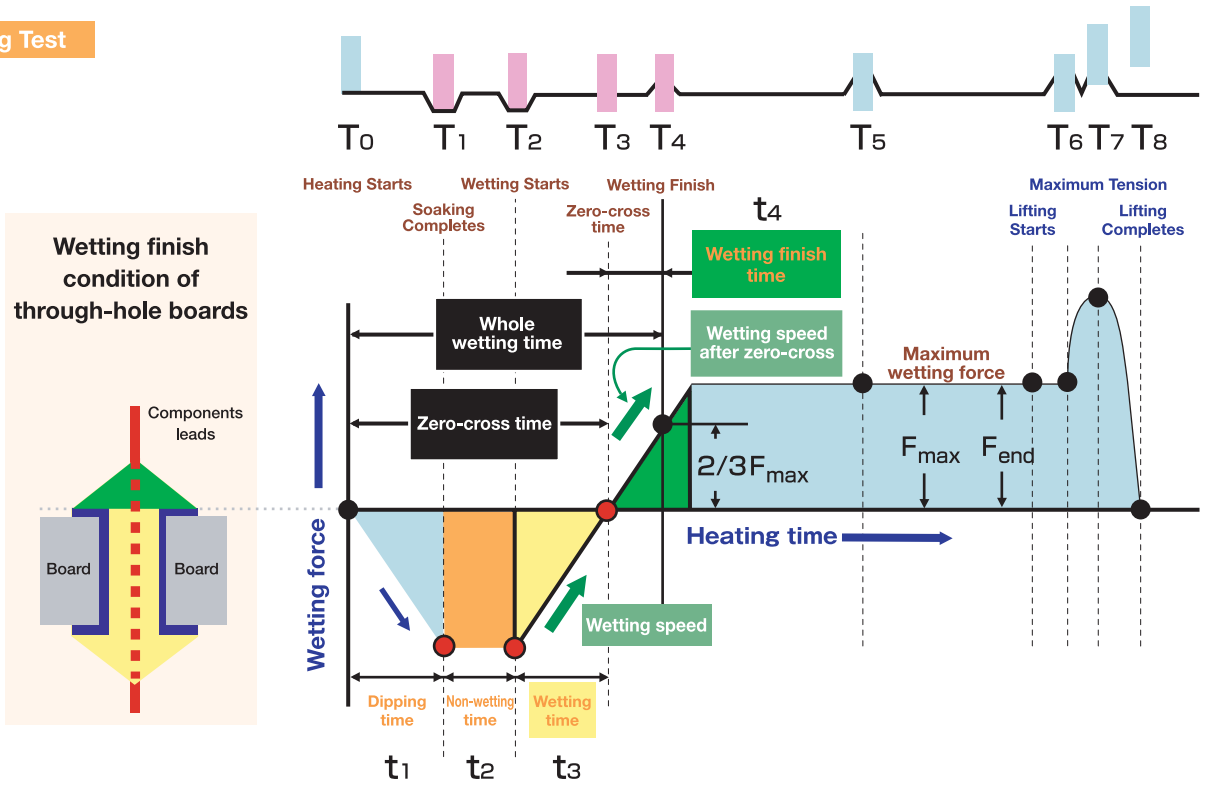
s one of the ways to evaluate solderability, there is Wetting Test (Wetting balance method). In general, solderability can be evaluated by zero-oss time, total wetting time, and maximum wetting force in wetting test. Whole wetting time can be divided into dipping time, non-wetting me, wetting time, and wetting finish time.

older penetrates the barrel in the board during wetting time. Soldering is conducted on the component lead located above solder surface uring wetting finish time.

herefore we can tell that wetting time and wetting finish time in through-hole board is extremely important in soldering through-hole boards. though SN100C takes longer to start wetting than Sn-3.0Ag-0.5Cu, whole wetting time of SN100C is shorter because once it starts wetting, etting speed and wetting speed after zero-cross are faster than that of Sn-3.0Ag-0.5Cu. With adequate heating of the copper pad and omponent leads, SN100C shortens non-wetting time and demonstrates better wettability.

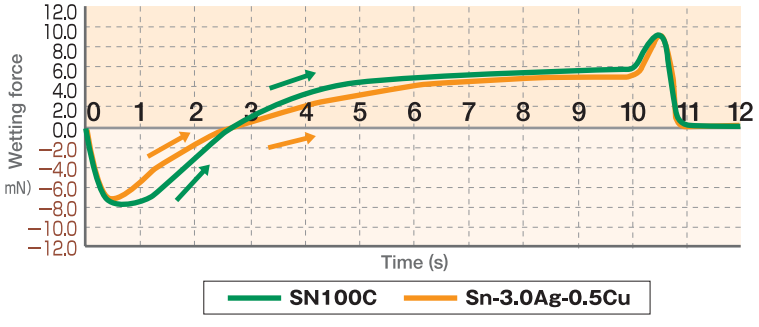
Recommended soldering temperature for SN100C when wave soldering is between 250℃ and 260℃.)

Wetting Test



SN100C vs Sn-3.0Ag-0.5Cu Wetting Test

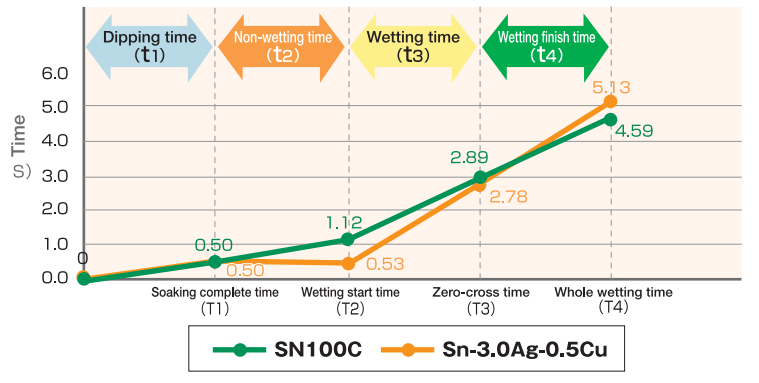
Difference in slope (➡) = difference in wetting speed and wetting speed after zero-cross



[Test condition]

- Test piece : Copper plate (Thickness : 0.3mm ,Width : 10mm , Length : 30mm)
- Used flux : NS-831
- Melting temperature : 255℃
- Contact depth : 2mm /s
- Contact speed : 4mm /s
- Contact time : 10sec.
- Lifting speed : 2mm /s

Comparison of wetting time and wetting finish time



Time	SN100C (s)	Sn-3.0Ag-0.5Cu(s)	SN100C/ Sn-3.0Ag-0.5Cu (%)
Dipping time (t1)	0.50	0.50	100
Non-wetting time (t2)	0.62	0.03	2067
Wetting time (t3)	1.77	2.25	79
Wetting finish time (t4)	1.70	2.35	72
Zero-cross time (T3)	2.89	2.78	104
Whole wetting time (T4)	4.59	5.13	89

Properties

Alloy

Item	Properties	Test method
Product code	SN100C	
Composition	Sn-0.7Cu-0.05Ni+Ge	
Melting point ℃	227	
S.G.	7.4	S.G. Measuring apparatus at 25℃
Tensile strength MPa	32	10mm/min. at 25℃
Elongation %	48	10mm/min. at 25℃

Flux Cored Solder Wire

Item	Properties					
	No-Clean High Activity				No-Clean Clear Residue	General Type
	JIS Z 3283 Class AA			JIS Z 3283 Class A	JIS Z 3283 Class A	JIS Z 3283 Class B
Flux type	010	011	020	210	110M	203
Flux content mass%	3.0, 4.0			2.5	2.0	
Halide content %	≦0.05	≦0.04	0	≦0.4	≦0.4	≦0.9
Resistivity of water extract Ω m	≧2000	≧3000	≧ 1 000	≧500	≧ 1 000	≧500
Insurance Resistance Ω 85℃85%RH	≧1.0 x 10^{10}	≧1.0 x 10^{10}	≧1.0 x 10^{10}	≧1.0 x 10^{9}	≧1.0 x 10^{9}	≧1.0 x 10^{9}
Spreading※	≧75	≧80	≧80	≧70	≧70	≧75

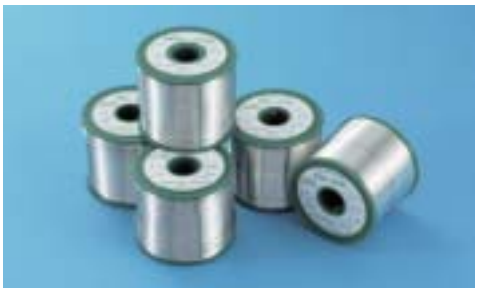
Test method : JIS Z 3197-1999 ※ Used solder : SN100C

Solder Paste

Item	Properties	Test method
Product code	SN100C PF-26 F M Q	
Powder size μm	45-20	
Flux content mass%	11.6	JIS Z 3197—1999 8.1.2
Halide content %	0	JIS Z 3197—1999 8.1.4.2.1
Spreading	75%	JIS Z 3197—1999 8.3.1.1
Viscosity	180 Pa･s	JIS Z 3284

Products

Solder Bar



Flux Cored Solder Wire

Solder Paste

(Note) All statements, technical information and recommendations contained herein are based on the data or other information available to use that we believe to be reliable but the accuracy and completeness of which we can not guarantee. Descriptions including specifications are subject to change without prior notification for the purpose of improvement in quality,etc.

SN100C : Patented in 24 countries and regions including JPN PAT. No.3152945 & US PAT. No.6180055 (as of November 2005)

Please feel free to inquire about the products that are not listed in this brochure

NIHON SUPERIOR http://www.nihonsuperior.co.jp

NIHON SUPERIOR CO., LTD.
Head Office
NS Bldg.,1-16-15, Esaka-Cho, Suita
564-0063, Japan
TEL : +81-(0)6-6380-1121
FAX : +81-(0)6-6380-1262
E-Mail : info@nihonsuperior.co.jp

Oversea Affiliates

Nihon Superior Trading (Singapore) Pte. Ltd.	TEL : +65-67414633	FAX : +65-67416636	E-Mail : nstspl@singnet.com.sg
Nihon Superior (Malaysia) Sdn. Bhd.	TEL : +60-(0)5-527-3792	FAX : +60-(0)5-527-3659	E-Mail : nihonip@nihonsuperior.com.my
Nihon Superior (Thailand) Co., Ltd.	TEL : +66-(0)2-285-4471/2	FAX : +66-(0)2-285-4358	E-Mail : nihonsup@loxinfo.co.th
Nihon Superior (Suzhou) Co., Ltd.	TEL : +86-(0)512-67488352	FAX : +86-(0)512-67488551	E-Mail : nssu@pub.sz.jsinfo.net
Nihon Superior (Shanghai) Co., Ltd.	TEL : +86-(0)21-34311573	FAX : +86-(0)21-34311583	E-Mail : nihonsh@mail.online.sh.cn
Nihon Superior (Taiwan) Co., Ltd.	TEL : +886-(0)2-2723-0628	FAX : +886-(0)2-2729-3167	E-Mail : nstw@nihonsuperior.com.tw

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