

INTRODUCTION

SCS7* is Asahi's latest lead free alloy development. As an enhanced tin/copper lead free alloy, it is highly recommended to directly replace existing SnCu0.7 solder. This alloy not only exhibits the excellent ductility of SnCu0.7 solder, it also possesses superior mechanical strength both in ambient and high temperature environments. SCS7's fatigue resistance is now comparable to tin/lead solder and as such, SCS7 has addressed the fundamental concerns of SnCu alloys.

SCS7 CLF4128 lead free water soluble core flux solder wire is developed for the use in electronic industries where the difficult assemblies are to be soldered. The flux residue is easily removed with DI water, providing the board with high ionic cleanliness. SCS7 CLF4128 provides excellent instant wetting action and superior solderability on a variety of surface finishes. It is low smoke, low spattering, less odor and no charring on solder iron tip.

SPECIFICATIONS

Item	Specifications	Test Standards
Flux Content	3.0 +/- 0.3 wt%	Singapore Asahi
Halide Content	0.4+/- 0.1 wt%	IPC-TM-650 2.3.35B JIS Z 3197: 1999 8.1.4.2.2
Surface Insulation Resistance (85°C, 85 %RH, 1000hrs)	>1 x 10 ¹⁰ Ω, Pass >1 x 10 ¹² Ω, Pass	IPC-TM-650 2.6.3.3 JIS Z 3197: 1999 8.5.3
Electromigration (85 °C, 85 %RH, 1000hrs)	No dendrite growth, Pass	JIS Z 3197:1999 8.5.4
Copper Corrosion Test	Pass	IPC-TM-650 2.6.15 JIS Z 3197: 1999 8.4.1
Copper Mirror Test	Classified as "H", Pass	IPC-TM-650 2.3.32 JIS Z 3197: 1999 8.4.2
Flux Activity Classification	ROH1	IPC J-STD-004A
Spread Factor	>75% (SCS7)	JIS Z 3197: 1999 8.3.1.1

* **UK patent No.GB2406101**

* **Japanese Patent No. 4048288**

ALLOY COMPOSITIONS

Main Composition		IPC J-STD-006B Specs (Wt %)
Tin	Sn	Remainder
Copper	Cu	0.7 +/- 0.1
Silicon	Si	0.02 +/- 0.01
Contamination		
Silver	Ag	0.10 max
Aluminium	Al	0.005 max
Arsenic	As	0.03 max
Bismuth	Bi	0.10 max
Cadmium	Cd	0.002 max
Iron	Fe	0.02 max
Indium	In	0.10 max
Nickel	Ni	0.01 max
Lead	Pb	0.05 max
Antimony	Sb	0.05 max
Zinc	Zn	0.003 max

PHYSICAL PROPERTIES

Melting Temperature	227°C
Coefficient of Thermal Expansion	22.7 µm/m°C
Density	7.30 g/cm ³

MECHANICAL PROPERTIES (As-Cast) (ASTM E8M 3mm/min at 23°C)

Tensile Strength	45.83 MPa
Yield Strength	38.78 MPa
Max Percent Strain	68.16 %
Energy to Yield Point	0.203 J
Energy to Break Point	18.05 J
Toughness	25.54 MPa
Creep Resistance (Load at 1kg @ 145°C)	>40hrs

APPLICATION

SCS7 CLF4128 lead free water soluble core flux solder wire is easy to use for automatic, manual, rework, point and brush soldering. For the best soldering results, the recommended parameters are shown:

Solder Iron Tips: All Types especially the tapered types
Soldering Temp: > 350°C
Soldering Time: 1 - 3 secs

- Keep solder iron tips clean.
- Tinned iron tips before use.
- Wear gloves when soldering to avoid contaminating the wire.

(Note: Soldering parameters are dependent on tip type, soldering station wattage configuration, wire diameter and type of applications.)

RESIDUAL REMOVAL

The flux residue can be left on board for up to 8 hours. The residue can be easily cleaned off with distilled or de-ionized water with agitation (ultrasonic/spray) and temperature of 40 - 60 °C.

STORAGE

Store the solder wire in a cool, dry and non-corrosive environment. Wrap up the solder wire when not in use to reduce exposure to environment. SCS7 CLF4128 lead free water soluble core flux solder wire can be kept for 2 years if proper storage conditions are observed.

HEALTH and SAFETY

Wear a chemical mask if the operators are allergic to the fumes released during soldering. For more information, please refer to Material Safety Data Sheet.

PACKAGING

SCS7 CLF4128 lead free water soluble core flux solder wire is commonly available in various diameters such as 0.25, 0.3, 0.4, 0.5, 0.6, 0.8, 1.0, 1.2, 1.6 and 2.0 mm. For different diameters, please specify your requirements.

Packaging	0.03kg	0.10kg	0.20kg	0.25kg	0.50kg	1.0kg
Diameter (mm)	0.25	0.3	0.4	0.5 to 2.0	0.5 to 2.0	0.8 to 2.0

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TEST ANALYSIS

Various tests were conducted to evaluate the performance and reliability of CLF4128 core flux.

HALIDE CONTENT

This test is to determine the amount of halide present in the cored flux.

Method:

By titration method with end point determination. The % chlorides calculated based on the following formula:

$$\text{Halides, as \% Chlorides} = \frac{3.55 \text{ VN} \times 100}{\text{ms}}$$

Result:

Halide Content = 0.4 wt%.

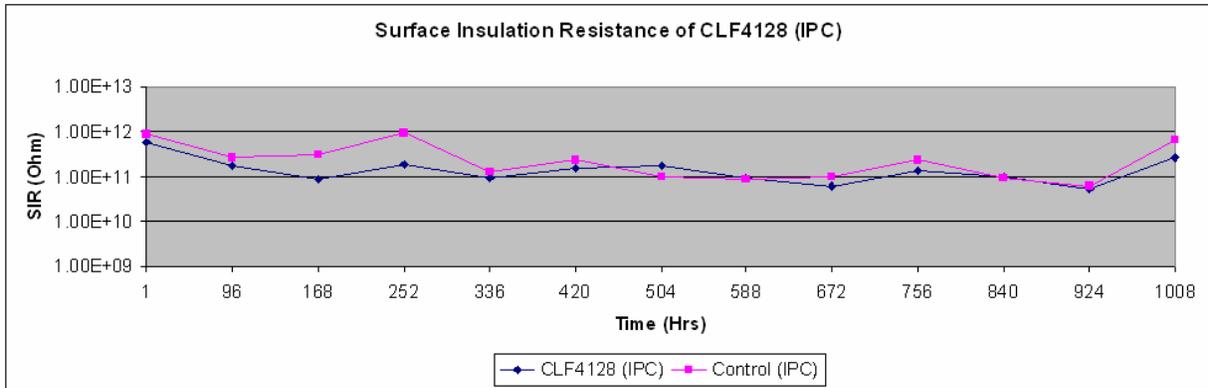
SURFACE INSULATION RESISTANCE

It determines the surface insulation properties of the flux on the finished product. Thus, it determines the reliability of the residue if left on board without cleaning.

Test Conditions (IPC-TM-650 2.6.3.3)

Humidity	:	85 %RH
Temperature	:	85°C
Duration	:	1000hrs
Bias Voltage	:	+50V D.C.
Applied Voltage	:	-100V D.C.
Test Coupon	:	IPC-B-24

Result:

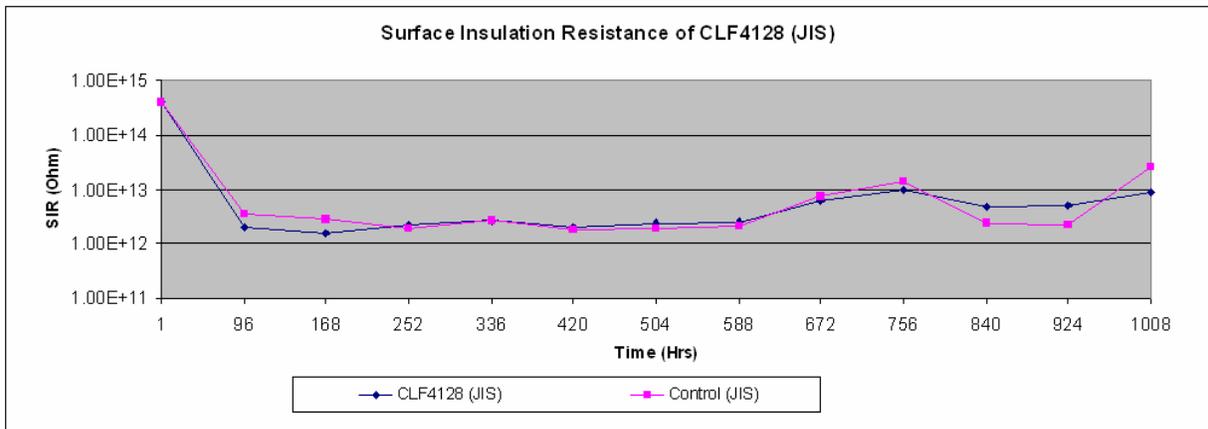


Surface Insulation Resistance: $>1 \times 10^{10} \Omega$, Pass.

Test Conditions (JIS Z 3197: 1999 8.5.3)

Humidity : 85 %RH
Temperature : 85°C
Duration : 1000hrs
Applied Voltage : -100V D.C.
Test Coupon : JIS C 6480

Result:



Surface Insulation Resistance: $>1 \times 10^{12} \Omega$, Pass.

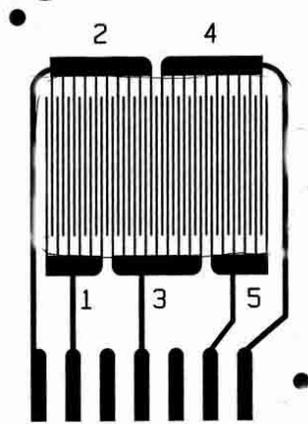
ELECTROMIGRATION

This test determines the existence of migration due to flux residue after soldering.

Standard : JIS Z 3197: 1999 8.5.4

Conditions :

Temperature	: 85°C
Humidity	: 85 %RH
Applied Voltage	: +50V Biased
Test Voltage	: -100V D.C.
Test Coupon	: JIS C 6480 coupon
Duration	: 1000hrs



Test Coupon: “Typical Comb Pattern” (JIS C 6480 coupon)

Result : No dendrite growth, Pass.

COPPER CORROSION TEST

Evaluate the extent of corrosion due to the flux residue after soldering under moisture.

Method:

- Weigh 1 gram of solder and make into a coil with a 3mm mandrel.
- Place the cleaned copper coupon on the surface of solder bath set to 280°C.
- Let the specimen remain on the solder bath surface for 5 secs after solder fusing.
- Allow the specimen to cool for 15mins.
- Place the specimen in a humidifier set at 40°C, 90 %RH for 96 hrs.
- Inspect the specimen for growth of corrosive compounds that are assumed to be green, bluish green or white.

Result:

No drastic change in appearance of copper under the residue or at the flux boundary. CLF4128 has passed the corrosion test.

COPPER MIRROR TEST

This test provides a visual check on the corrosive effect of the flux on the substrate.

Method:

- Place one drop of test flux onto the copper mirror.
- Keep copper mirror at 23 +/- 2°C & 50 +/- 5 %RH for 24 hrs.
- Remove test flux by immersion in clean 2-propanol.

Result:

The results showed that CLF4128 is classified as "H".

SPREAD TEST

The purpose of this test is to measure the spread capability of the CLF4128 core flux.

Method:

- Maintain hot plate temperature at 280°C.
- Place the solder wire (Ø3mm) on a copper coupon.
- Place the coupon on hot plate for 15 secs.
- Lift the test piece from hot plate and cool down to room temperature.
- Measure rate of spread with the formula below:

$$\begin{aligned} \text{Rate of Spread} &= (D-H)/D \times 100\% \\ \text{where } D &= 1.24 \times V^{1/3} \\ V &= \text{Mass / Specific Gravity} \\ H &= \text{Height of Spread Solder} \end{aligned}$$

Result:

The result showed that CLF4128 had a spread factor of >75% with SCS7 solder.

RESIDUE DRYNESS TEST

This test determines the tackiness of the residue after soldering.

Method:

- Place circular solid solder wire preform on Cu coupon.
- Add 0.035 to 0.040g of solid portion of flux to centre of wire preform.
- Set solder bath temperature at 50 +/2 °C above the alloy's liquidus temperature.
- Place the Cu coupon on solder bath.
- After fusing of solder, leave it for 5 secs.
- Take the test piece out of the bath and cool it for 30 mins.
- Sprinkle powder talc onto the flux residue on the test piece.
- Brush the surface of the residue in the same direction twice and inspect test piece.

Result:

Powder falls off test piece easily. The flux residue has passed the dryness test.

DISCLAIMER OF LIABILITY

"All statements, information and recommendations contained in this catalog are based on data and test results which we consider, to the best of our knowledge and belief, to be reliable and informative to the users but the accuracy and completeness thereof is not guaranteed. No warranty, expressed or implied, statutory or otherwise, is given regarding the use of the information and products contained in this catalog since the conditions and suitability for use, handlings, storage or possession of the products are determined by the users and are therefore beyond our control. We shall not be liable in respect of any liabilities, losses (including consequential losses), damages, proceedings, costs, claims or injuries whatsoever sustained or suffered by the users (including any third parties) in connection with the use of the information, recommendation and the products contained in this catalog."

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