



DSP 769LF (SAC-305,
Sn96.5/Ag3.5,
Sn100e-Sn/Cu/Co)
LEAD FREE, ZERO
HALOGEN
WATER SOLUBLE

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Description

Delta Solder Paste 769LF is a Zero halogen, water-soluble solder paste for both Nitrogen and Air reflow applications. 769LF was designed specifically for high melting temperature lead-free alloys, such as Sac-305, Sn96.5/Ag3.5 and Sn100E. It provides the fluxing activity levels that promote thermal stability and prevents thermal degradation when reflowing under air atmosphere. 769LF provides a consistent print performance at wide humidity levels, excellent solderability and promotes excellent cleaning performance to yield bright, shiny solder joints. 769LF is a stable water-soluble formulation that provides consistent tack time, stencil life and print definition. 769LF is classified as ORH0 flux under IPC-J-STD-004B.

Main Features

- ❑ Zero halogen
- ❑ Low voiding
- ❑ Enhanced print characteristics on fine pitch pad size
- ❑ Very Low foaming
- ❑ Extended stencil life
- ❑ Long tack time
- ❑ Excellent wettability
- ❑ Suitable with air or nitrogen atmosphere

Technical Data

Flux Classification	Specification	Test Method
	ORH0	J-STD-004B
Copper Mirror	Partial removal of copper film	IPC-TM-650 2.3.32
Corrosion	Pass (L)	IPC-TM-650 2.6.15
SIR		
J-STD-004	Pass- 5.65×10^{10} ohms	IPC-TM-650 2.6.3.3
Post Reflow Flux Residue	40%	TGA Analysis
Acid Value	33	IPC-TM-650 2.3.13
Metal Loading	88-90%	IPC-TM-650 2.2.20
Viscosity		
Malcom ⁽²⁾ , Pa.s	200-300	IPC-TM-650 2.4.34.3 modified
Thixotropic Index	0.40- 0.50	
Slump Test	Pass	IPC-TM-650 2.4.35
Solder Ball Test	Pass	IPC-TM-650 2.4.43
Tack		
Initial	101 gm	JIS Z 3284
Tack retention @ 24 hr	105 gm	JIS Z 3284
Tack retention @ 96 hr	106 gm	JIS Z 3284
Stencil Life	4-8 hrs	QIT 3.44.5
Abandon Time	30-60 min	QIT 3.44.6

Physical Properties

Solder Composition

Qualitek Sac-305 and Sn96.5/Ag3.5 is designed as a lead-free alternative for Sn/Pb alloys for electronics assembly operations. Qualitek Sac-305 and Sn96.5/Ag3.5 alloy conforms and exceeds the impurity requirements of J-STD-006C and all other relevant international standards.

Typical Analysis													
Sn	Ag	Cu	Pb	Sb	Bi	In	As	Fe	Ni	Cd	Al	Zn	Au
Bal	3.0-4.0	0.080 Max	0.070 Max	0.200 Max	0.100 Max	0.100 Max	0.030 Max	0.020 Max	0.010 Max	0.002 Max	0.005 Max	0.003 Max	0.050 Max

	Sn/Ag/Cu	Sn63/Pb37		Sn/Ag/Cu	Sn63/Pb37
Melting Point, °C	217-221	183 E	Yield Strength, psi	3724	3950
Hardness, Brinell	15HB	14HB	Total Elongation, %	27	48
Coefficient of Thermal Expansion	Pure Sn= 23.5	24.7	Joint Shear Strength, at 0.1mm/min 20 °C	27	23
Tensile Strength, psi	4312	4442	Joint Shear Strength, at 0.1mm/min 100 °C	17	14
Density, g/cc	7.39	8.42	Creep Strength, N/mm ² at 0.1mm/min 20 °C	13	3.3
Electrical Resistivity, (μohm-cm)	13	14.5	Creep Strength, N/mm ² at 0.1mm/min 100 °C	5	1
Electrical Conductivity, %IACS	16.6	11.9	Thermal Conductivity, W/m.K	58.7	50.9

Particle Size

Sac-305 and Sn/Ag/Cu alloy are available in 3(45-25μm), 4(38-20μm), 5(25um-15um) and 6(5um-15um) J-STD-005 powder distribution. Solder powder distribution is measured utilizing laser diffraction, optical analysis and sieve analysis. Careful control of solder powder manufacturing processes ensures the particles' shape are 95% spherical minimum (aspect ratio < 1.5) and that the alloy contains a typical maximum oxide level of 100 ppm.

Metal Loading

Typical metal loading for stencil printing application is **88-89%**. Compared to typical Sn63/Sn62 solder pastes manufactured with 90% by weight metal loading, DSP 769LF Lead Free provides as much as 10-12% higher metal volume than Sn63/Sn62. This increased in volume of DSP 769LF promotes better wetting and spreading of Sac-305, Sn96.5/Ag3.5 lead free alloys.

Printing of Solder Paste

Stencil

Use of chemical etched/electroformed stencil is preferred however DSP 769LF has been used successfully with chemical etch, electroformed, and laser cut stencils.

Squeegee

- Blades:* Metal (stainless steel) squeegee blades angled from 45-60° give the best print definition. Metal (nickel) squeegee blades angled from 45-60° give the best performance. 90 durometer polyurethane may also be used.
- Pressure:* Pressure should be adjusted at the point where the paste leaves a relatively clean stencil after each print pass. Typical pressure setting is 0.6-1.5lb per linear inch of blade.
- Speed:* Normal print speeds are 1.0-2.5 (25-50mm) per second. As print speeds increase pressure will need to be increased. Although slower print speeds are desirable, Qualitek solder paste is capable of printing up to 6 inch per second.

Print Definition

DSP 769LF provides excellent print definition characterized by brick-like prints. Good release is seen on 12-9 mil apertures with print speeds in the range of 1.0-6.0 inch per second (25mm-150mm).

Open & Abandon Time

Tests have proven that DSP 769LF will perform during continuous printing for up to 8 hrs. Field test have shown that an abandon time of at least 1 hr is possible, resulting in a perfect 1st pass print on resumption of printing.

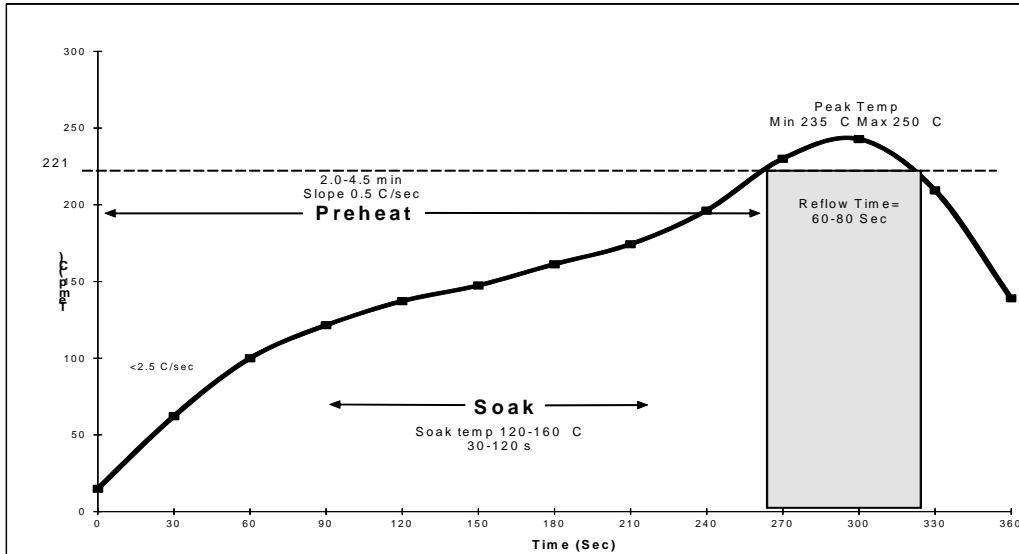
Paste Application

Solder paste should be taken out of the refrigerator at least 3 to 6 hours prior to use. This will give the paste enough time to come to thermal equilibrium with the environment. Also, any fresh jar of solder paste should be gently mixed for at least one minute with a spatula. Be sure not to mix the paste too vigorously, as this will degrade the paste's viscosity characteristics and introduce entrapped air into the paste. The purpose of the mixing is to insure that the paste is smooth and consistent. If solder paste is supplied in cartridges pre-mixing is not necessary due to the shear action produced from the dispensing.

Reflow

Best results have been achieved when Sac-305, Sn96.5/Ag3.5 and Sn100e (Sn/Cu/Co) DSP 769LF is reflowed in a **forced air convection** oven with a minimum of 8 zones (top & bottom), however, reflow is possible with a 4 zone oven (top & bottom).

The following is a recommended profile for a forced air convection reflow process. The melting temperature of the solder, the heat resistance of the components, and the characteristics of the PCB (i.e. density, thickness, etc.) determine the actual reflow profile.



Preheat Zone- The preheat zone, is also referred to as the ramp zone, and is used to elevate the temperature of the PCB to the desired soak temperature. In the preheat zone the temperature of the PCB is constantly rising, at a rate that should not exceed 2.5 C/sec. The oven's preheat zone should normally occupy 25-33% of the total heated tunnel length.

The Soak Zone- normally occupies 33-50% of the total heated tunnel length exposes the PCB to a relatively steady temperature that will allow the components of different mass to be uniform in temperature. The soak zone also allows the flux to concentrate and the volatiles to escape from the paste.

The Reflow Zone- or spike zone is to elevate the temperature of the PCB assembly from the activation temperature to the recommended peak temperature. The activation temperature is always somewhat below the melting point of the alloy, while the peak temperature is always above the melting point.

Flux Residues & Cleaning

DSP 769LF is water-soluble formulation; therefore, the residues are required to be removed. Residue removal is easily achieved, with the use of hot 60 °C (140 °F) de-ionized water in either a batch or conveyor cleaner system. Spray pressures should be maintained at 20-30 psi and conveyor speed of 3-6ft/min.

Storage & Shelf Life

It is recommended that solder paste be stored at a temperature of between 35-50 °F (2-10 °C) to minimize solvent evaporation, flux separation, and chemical activity. If room temperature storage is necessary, it should be maintain between 68-77 °F (20-25 °C).

Shelf Life

Unopened Container (35-50°F/2-10°C) 6 months (from DOM)

Unopened Container (68-77°F/20-25°C) 1 month (from DOM)

Working Environment

Solder paste performs best when used in a controlled environment. Maintaining ambient temperature of between 68-77 °F (20-25 °C) at a relative humidity of 40-65% will ensure consistent performance and maximum life of paste.

Cleaning Misprint Boards

If you should have a misprinted board, the paste may be cleaned off manually with alcohol (IPA) or Qualitek stencil cleaner, SK-11. If you have a more elaborate board cleaner, the paste may be easily removed with use of a 5% saponifier solution in hot DI water. Qualitek SK-45 Stencil Cleaner could be used in this process.

Stencil Cleaning

Periodic cleaning of the stencil during production is recommended to prevent any paste from being deposited in unwanted areas of the board. Without stencil cleaning, solder balling will increase. We recommend a periodic dry wipe (every 5 to 10 boards) with an occasional wet wipe (every 15 to 25 boards). When running fine pitch boards, the cleaning may need to become more frequent. The wet wipes should be performed with either alcohol or a stencil cleaner. Qualitek SK-11 stencil cleaner is designed for this purpose. When cleaning the stencil at the end of a job, the cleaning should be more thorough. If you have stencil cleaning equipment, Qualitek SK- 45 Stencil Cleaner is highly recommended for stencil cleaning purposes.

Packaging

6 oz. Jar	250-500 gm
6 oz. Cartridge	500-700 gm
12 oz. Cartridge	1000-1400 gm

Disposal

DSP769LF should be stored in a sealed container and disposed of in accordance with state & local authority requirements.