DSP 788 (Sn63/Pb37) WATER SOLUBLE DELTA® SOLDER PASTE

CORPORATE HEADQUARTERS USA: 315 Fairbank St. Addison, IL • 630-628-8083 • FAX 630-628-6543
EUROPE UK: Unit 9 Apex Ct. Bassendale Rd. Bromborough, Wirral CH62 3RE • 44 151 334 0888 • FAX 44 151 346 1408
ASIA-PACIFIC HEADQUARTERS SINGAPORE: 6 Tuas South St. 5 Singapore 637790 • 65 6795 7757 • FAX 65 6795 7767
PHILIPPINES: Phase 1 Qualitek Ave. Mariveles, Bataan Philippines C-2106 • 6347 935 4163 • FAX 63475613717
CHINA: 3B/F, YiPa Print Bldg. 351 # JiHua Rd., Buji Shenzhen, China 518112 • 86 755 28522814 • FAX 86 755 28522787

This data is based on information that the manufacturer believed to be reliable and offered in good faith. Qualitek International, Inc. makes no warranties expressed or implied as to its accuracy and assumes no responsibilities and liabilities arising out of its use by others as conditions and methods of use of the products is beyond the control of Qualitek International, Inc. The user must determine the suitability of the product before using it on a commercial basis. The warranties extend only to the conformity of the product to the physical descriptions. In no event will Qualitek International, Inc. be responsible for special, incidental and consequential damages whether the claim is in contract, negligence or otherwise. Qualitek specifically disclaims any liability for consequential or incidental damages of any kind, including lost profits.

Description

Delta® Solder Paste 788 is a halide-free, slump resistant water-soluble solder paste designed for Sn/Pb surface mount and other electronic assembly applications. DSP 788 utilizes a low volatility solvent system, resulting in a tack time of over 8 hours. Post soldering residue can be easily removed with warm de-ionized water cleaning systems.

Main Features

- Halide-free
- Non-hygroscopic
- High tack force
- High slump resistance
- Easy removal of flux residues
- Extended stencil life

Technical Data

	Specification	Test Method
Flux Classification	ORL0	IPC-J-STD-004B
Copper Mirror	No removal of copper film	IPC-TM-650 2.3.32
Corrosion (Cleaned)	Pass	IPC-TM-650 2.6.15
SIR (Cleaned)	>1 x 10^8 ohms	IPC-TM-650 2.6.3.3
Metal Loading	90%	IPC-TM-650 2.2.20
Viscosity		
Brookfield [(1)], kcps	1000+/-10% kcps	IPC-TM-650 2.4.34 modified
Malcom [(2)], poise	2100-2500	IPC-TM-650 2.4.34.3 modified
Thixotropic Index	0.50-0.60	
Slump Test	Pass	IPC-TM-650 2.4.35
Solder Ball Test	Pass	IPC-TM-650 2.4.43
Corrosion (Cleaned)	Pass	IPC-TM-650 2.6.15
Tack		
Initial	85 gm	JIS Z 3284
Tack retention @ 24 hr.	68 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

Sn63/Pb37 alloy is the conventional eutectic solder used in most electronic assemblies. Qualitek® Sn63 alloy conforms and exceeds the impurity requirements of IPC-J-STD-006C and all other relevant international standards.

Typical Analysis													
Sn	**Pb**	**Al**	**Ag**	**As**	**Au**	**Bi**	**Cd**	**Cu**	**Fe**	**In**	**Ni**	**Sb**	**Zn**
62.5-63.5	Bal.	0.005 Max	0.100 Max	0.030 Max	0.050 Max	0.100 Max	0.002 Max	0.080 Max	0.020 Max	0.100 Max	0.010 Max	0.200 Max	0.003 Max

	Sn63/Pb37
Melting Point, °C	183 E
Hardness, Brinell	14HB
Coefficient of Thermal Expansion	24.7
Tensile Strength, psi	4442
Density, g/cc	8.42
Electrical Resistivity, (μohm-cm)	14.5
Electrical Conductivity, 10^4/ohm-cm	6.9

	Sn63/Pb37
Yield Strength, psi	3950
Total Elongation, %	48
Joint Shear Strength, at 0.1mm/min 20 °C	23
Joint Shear Strength, at 0.1mm/min 100 °C	14
Creep Strength, N/mm^2 at 0.1mm/min 20 °C	3.3
Creep Strength, N/mm^2 at 0.1mm/min 20 °C	1
Thermal Conductivity, W/m.K	50.9

Particle Size

Sn63 alloy is available in Type 3(45-25μm) and 4(38-20μm) 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 80 ppm.

Metal Loading

Typical metal loading for stencil printing application is **89 - 90 %.**

Printing of Solder Paste

Stencil

Use of chemical etched/electroformed stencil is preferred however DSP 788 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 are1.0-2.5 (25-50mm) per second. As print speeds increase pressure will need to be increased. Although slower print speeds are desirable, Qualitek solder paste can print up to 6 inches per second.

Print Definition

DSP 788 provides excellent print definition characterized by brick-like prints. Good release is seen on 12-9 mil apertures with prints speeds in the range of 1.0-6.0 inch per second (25mm-150mm).

Open & Abandon Time

Tests have proven that DSP 788 will perform during continuous printing for up to 8 hrs. Field tests have shown that an abandon time of at least 1 hr is possible, resulting in a perfect 1st pass print on resumption of printing.

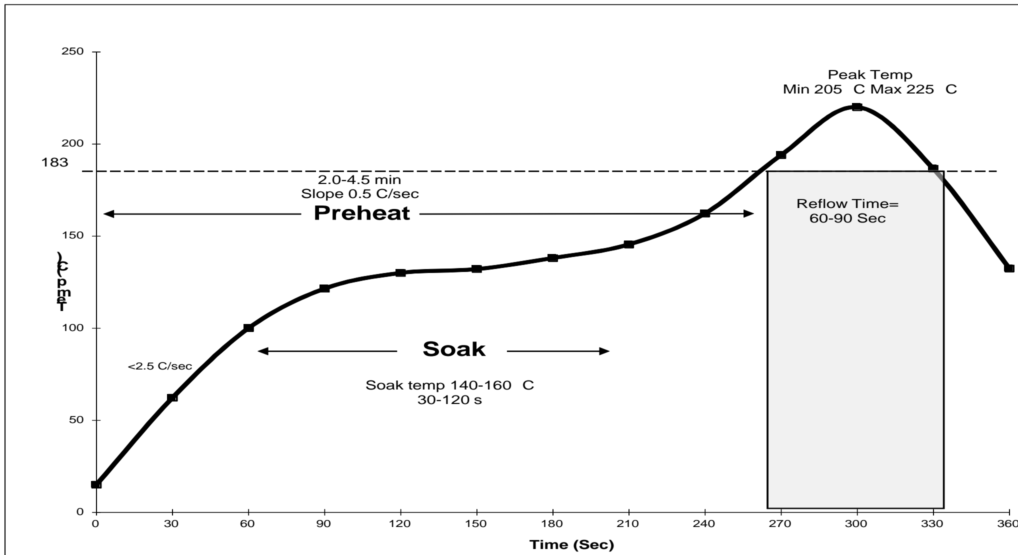
Paste Application

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 ensure 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 acheived when DSP 788 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 788 is water soluble formulation; therefore, the residues need 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. Spray pressures should be maintained at 20-30 psi and conveyor speed of 3-6ft./min.

Storage & Shelf Life

It is recommended that Delta Solder Paste be stored at a temperature of between 35-50 °F (2-10 °C) to minimize solvent evaporation, flux separation, and chemical activity. Shelf life is 6 months from date of manufacture.

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.

Stencil Cleaning

Periodic cleaning of the stencil during production is recommended to prevent any paste from being deposited in unwanted areas of the board and to eliminate solder balling. Qualitek offers Multi-Cleaner 1515 that may be used for this purpose. Qualitek SK- 45 Stencil Cleaner is highly recommended with stencil cleaning equipment.

Packaging

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

Disposal

DSP 788 should be stored in a sealed container and disposed of according to all local, regional, national and international regulations.

Delta® and Qualitek® are brands of Qualitek International, Inc. For Health and Safety information, refer to Safety Data Sheet.