DSP 718D
LEAD FREE
Water Soluble SOLDER PASTE

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Physical Properties

Solder Composition

Qualitek Sn/Ag/Cu (Tin/Silver/Cu) Alloys are designed as a lead-free alternative for Sn/Pb alloys for electronics assembly operations. The Qualitek Sn/Ag/Cu alloys conform and exceed the impurity requirements of J-Std-006 and all other relevant international standards.

Typical Analysis

	Sn	Ag	Cu	Pb	Sb	Bi	In	As	Fe	Ni	Cd	Al	Zn	Au
LF955-38	Bal	3.6-4.0	0.5-0.9	0.050 Max	0.050 Max	0.050 Max	0.050 Max	0.010 Max	0.010 Max	0.005 Max	0.001 Max	0.001 Max	0.001 Max	0.002 Max
LF958-35	Bal	3.3-3.7	0.5-0.9	0.050 Max	0.050 Max	0.050 Max	0.050 Max	0.010 Max	0.010 Max	0.005 Max	0.001 Max	0.001 Max	0.001 Max	0.002 Max
LF965-30	Bal	2.8-3.2	0.3-0.7	0.050 Max	0.050 Max	0.050 Max	0.050 Max	0.010 Max	0.010 Max	0.005 Max	0.001 Max	0.001 Max	0.001 Max	0.002 Max
LF217	Bal	3.8-4.2	0.3-0.7	0.050 Max	0.050 Max	0.050 Max	0.050 Max	0.010 Max	0.010 Max	0.005 Max	0.001 Max	0.001 Max	0.001 Max	0.002 Max

	Sn/Ag/Cu	Sn63/Pb37
Melting Point, ^{o} C	217-221	183 E
Hardness, Brinell	15HB	14HB
Coefficient of Thermal Expansion	Pure Sn= 23.5	24.7
Tensile Strength, psi	4312	4442
Density, g/cc	7.39	8.42
Electrical Resistivity , (μohm-cm)	13.0	14.5
Electrical Conductivity, %IACS	16.6	11.9

	Sn/Ag/Cu	Sn63/Pb37
Yield Strength, psi	3724	3950
Total Elongation,%	27	48
Joint Shear Strength, at 0.1mm/min 20 C	27	23
Joint Shear Strength, at 0.1mm/min 100 C	17	14
Creep Strength, N/mm^2 at 0.1mm/min 20 C	13.0	3.3
Creep Strength, N/mm^2 at 0.1mm/min 100 C	5	1
Thermal Conductivity, W/m.K	58.7	50.9

Particle Size

Sn/Ag/Cu alloys are available in Type 2 (75-45μm), 3(45-25μm), 4(38-20μm), and 5 (25-15μm) 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.

Classification of Solder Powders by Particle Size

Powder Type	Fines	Majority		Coarse		Typical Mesh
	<10%	>80%	>90%	<1%	0%	
1	20	75-150		150	160	100/200
2	20	45-75		75	80	200/325
3	20	25-45		45	50	325/500
4	20		20-38	38	40	400/635
5	15		15-25	25	30	500
6	5		5-15	15	20	

Metal Loading

Typical metal loading for dispensing application is **85-87 %.** Compared to typical Sn63/Sn62 solder pastes manufactured with 88% by weight metal loading, DSP718D Lead Free provides as much as 10-12% higher metal volume than Sn63/Sn62. This increased in volume of DSP718D promotes better wetting and spreading of Sn/Ag/Cu Lead Free alloy.

Solder Paste

Qualitek has developed a unique flux system designed specifically for high temperature lead free alloys. It provides the fluxing activity levels that promote thermal stability and prevents thermal degradation when reflowing under air atmosphere (normal). Since use of nitrogen is not required, 718D Lead Free Solder paste will provide excellent cost savings.

In addition, 718D Lead Free solder paste exhibits superior joint strength, excellent wettability, extraordinary print definition and tack life.

Main Features

- Low foaming
- Long tack time
- Excellent wettability

	Specification	Test Method
Flux Classification	ORH1	JSTD-004
Copper Mirror	Complete removal of copper film	IPC-TM-650 2.3.32
Silver Chromate	Pass	IPC-TM-650 2.3.33
Corrosion	Pass	IPC-TM-650 2.6.15
SIR		
JSTD-004	4.55 x 10^{10} ohms	IPC-TM-650 2.6.3.3
Bellcore (Telecordia)	3.22 x 10^{10} ohms	Bellcore GR-78-CORE 13.1.3
Electromigration	Pass	Bellcore GR-78-CORE 13.1.4
Post Reflow Flux Residue	60%	TGA Analysis
Acid Value	60	IPC-TM-650 2.3.13
Metal Loading	86%	IPC-TM-650 2.2.20
Viscosity		
Brookfield (1), kcps	400+/-10% kcps	IPC-TM-650 2.4.34 modified
Malcom (2), poise	850 - 1100	IPC-TM-650 2.4.34.3 modified
Thixotropic Index	0.50-0.60	
Solder Ball Test	Pass	IPC-TM-650 2.4.43
Tack		
Initial	96 gm	JIS Z 3284
Tack retention @ 24 hr	127gm	JIS Z 3284
Tack retention @ 72 hr	136 gm	JIS Z 3284

Dispensing

	Needle inner diameter		Applicable powder
Needle Gauge	in.	μm	(mesh cut)
18	0.033	838	-200+325
20	0.023	584	-325+500
21	0.020	508	-325+500
22	0.016	406	-325+500
23	0.013	330	-325+500
25	0.010	254	-400+635
27	0.008	203	-500

The clearance gap between the needle and the substrate affects the shape and quality of the dot dispensed. If the clearance is too little, the dot tends to be flattened out, and if too large, the dot tends to have long tailing.

Pressure

The pressure applied in the syringe should be kept at a minimum, and the proper head pressure kept in the range of 15-25 lb/in^2 (1.05-1.76 kg/cm^2). In cases where a paste requires much higher pressure (more than 40 lb/in^2 or 2.82 kg/cm^2) to dispense, the paste will become inconsistent and clogging may be expected. The external air pressure supply should be maintained constant.

Open & Abandon Time

Tests have proven that DSP718D will perform during continuous dispensing for up to 8 hrs. The paste can be left in the dispensing unit for up to 4 hours without paste drying out. If extended downtime is expected (>4 hrs) , the whole dispensing system should be flushed without leaving any paste in any part of the system.

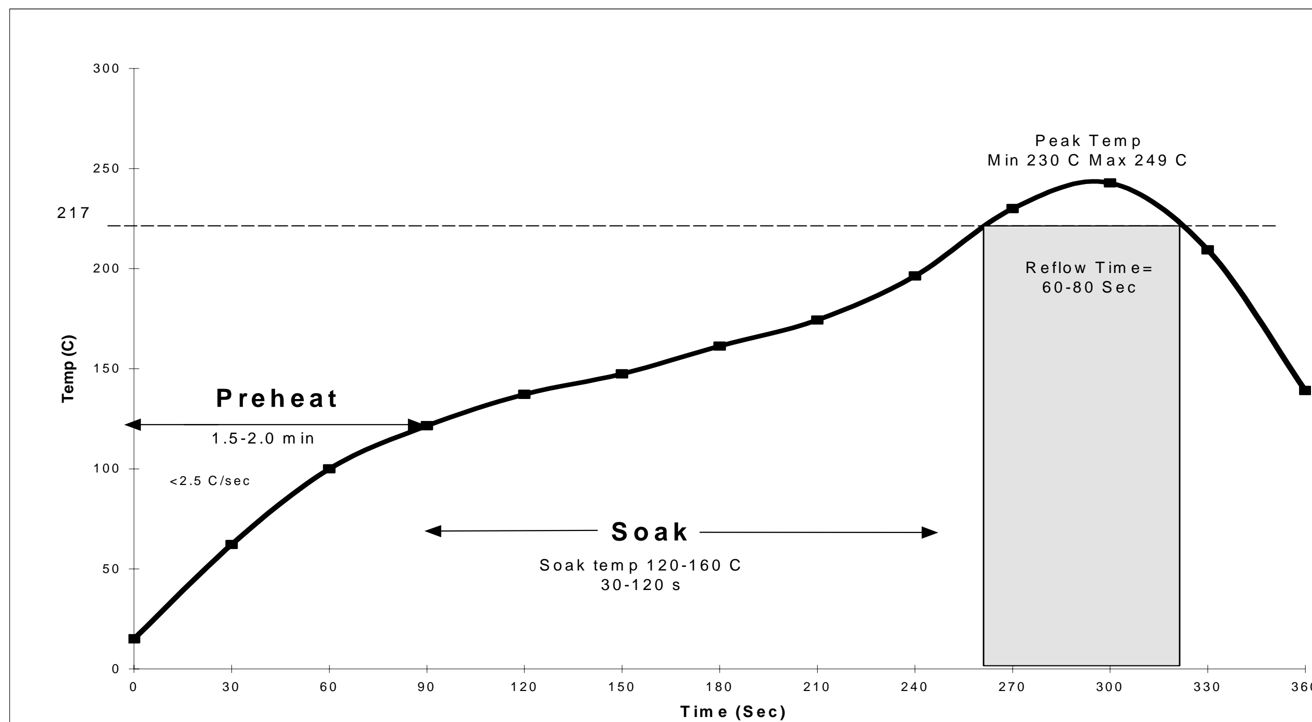
Paste Application

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. The flow rate of paste in a dispensing application depends on viscosity, which can be altered by temperature change. If solder paste is supplied in syringes pre-mixing is not necessary due to the shear action produced from the dispensing.

Reflow

Best results have been acheived when DSP 718D 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.*

CLEANING

718D 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 conveyorized cleaner. 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)
Opened Container (68-77 °F/20-25°C)   24 hours

Reusing Solder Paste

This is not normally recommended, because it typically generates more problems than it is worth. If you do decide to reuse solder paste, these pointers may be helpful. This paste should be tightly sealed and refrigerated. Then, the paste may be reused at a later date, provided that the paste has not separated or thickened significantly compared to its original properties. Storage of syringes is preferred in an upright position with tip down to prevent flux separation and air entrapment.

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-44 saponifier could be used in this process.

Disposal

DSP 718D should be stored in a sealed container and disposed of in accordance with state & local authority requirements.

Packaging

10cc   35 gm
30cc   100 gm