



**DSP 888D (Sn42/Bi58)
LEAD FREE
NO CLEAN DISPENSING
SOLDER PASTE**

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Description

Qualitek® has developed a no clean dispensing paste flux designed specifically for low temperature lead free alloys, such as Sn42/Bi58. Delta® Solder Paste 888D is available in 10cc and 30cc syringes for easy dispensing for heat-sensitive rework applications.

In addition, DSP 888D lead free solder paste exhibits superior joint strength and excellent wettability. The post soldering residues of DSP 888D are non-conductive and non-corrosive.

Main Features

- Low residues
- Easily dispensed
- Low melting temperature alloy allows for heat-sensitive applications
- Hard, non-conductive residues

Technical Data

	Specification	Test Method
Flux Classification	ROLO	IPC-J-STD-004B
Copper Mirror	No removal of copper film	IPC-TM-650 2.3.32
Corrosion	Pass	IPC-TM-650 2.6.15
SIR	6.41 x 10 ¹¹ ohms	IPC-TM-650 2.6.3.3
Post Reflow Flux Residue	45%	TGA Analysis
Metal Loading	87%	IPC-TM-650 2.2.20
Viscosity		
Malcom ⁽²⁾ , poise	850-1100	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
Tack		
Tack retention @ 24 hr	105 gm	JIS Z 3284
Tack retention @ 72 hr	96 gm	JIS Z 3284

Physical Properties

Solder Composition

Qualitek® Bi58 is designed as a low melting temperature lead-free alloy for electronics assembly operations. The Qualitek Bi58 alloy conforms and exceeds the impurity requirements of IPC- 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	0.100 Max	0.080 Max	0.070 Max	0.200 Max	57.5- 58.5	0.100 Max	0.030 Max	0.020 Max	0.010 Max	0.002 Max	0.005 Max	0.003 Max	0.050 Max

	Sn42/Bi58
Melting Point, °C	138 E
Hardness, Brinell	22HB
Coefficient of Thermal Expansion	13.8
Tensile Strength, psi	8766
Density, g/cc	8.72
Electrical Resistivity (μohm-cm)	34.5
Electrical Conductivity, %IACS	4.5

	Sn42/Bi58
Yield Strength, psi	7119
Total Elongation,%	46
Shear Strength MPa, at 1mm/min 20 °C	27
Shear Strength MPa, at 1mm/min 100 °C	15.6
Fatigue Strength, Mpa at 1000 cycles 20 °C	16
Fatigue Strength, Mpa at 1000 cycles 100 °C	7.9
Specific Heat (J/g)	46

Particle Size

Sn42/Bi58 alloy is available in Type 3(45-25μm) IPC-J-STD-005A 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 dispensing application is **86-87%**. Compared to typical Sn63/Sn62 dispensing solder pastes manufactured with 88% by weight metal loading, DSP 888D Lead Free provides as much as 10-12% higher metal volume than Sn63/Sn62. This increased in volume of DSP 888D promotes better wetting and spreading of Sn42/Bi58 alloy.

Dispensing

Needle Gauge	Needle inner diameter		Applicable powder
	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/in² (1.05-1.76 kg/cm²). In cases where a paste requires much higher pressure (more than 40 lb/in² or 2.82 kg/cm²) 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 DSP 888D 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 sysem should be flushed without leaving any paste in any part of the system.

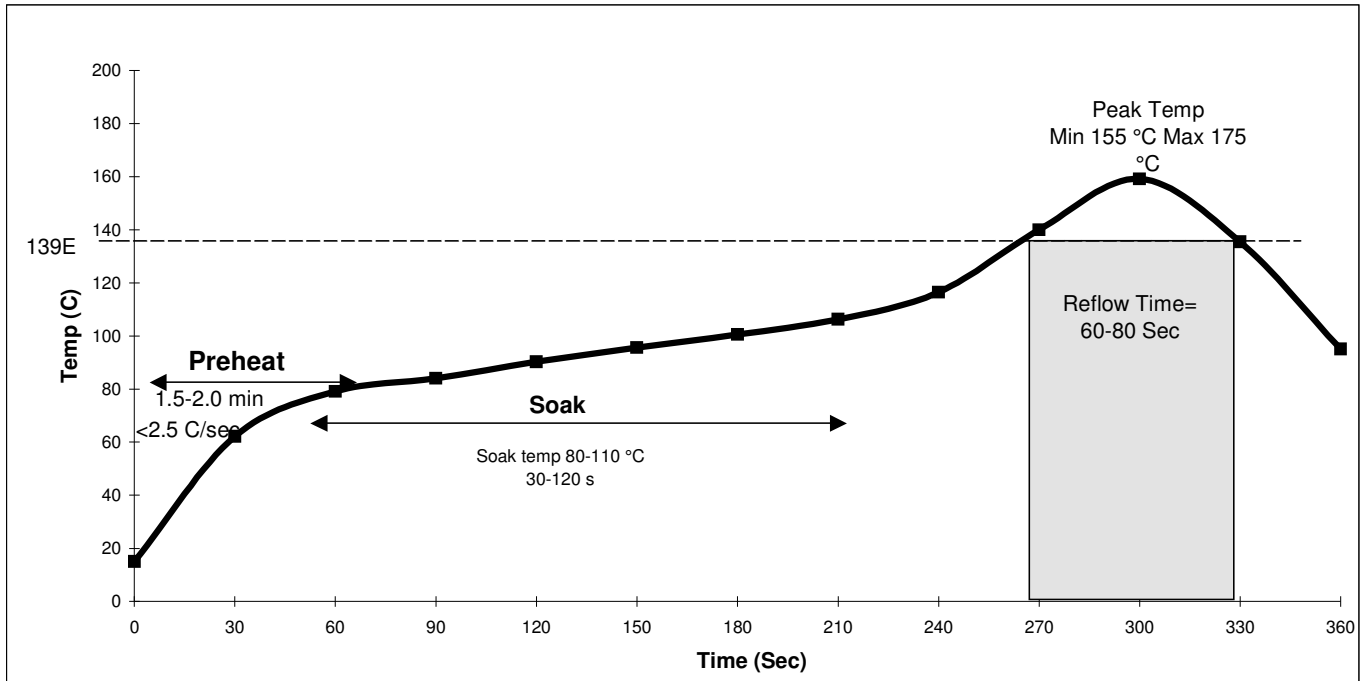
Paste Application

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 cn 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 achieved when DSP 888D 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 of Flux Residues

DSP 888D is a no clean formulation, therefore, the residues do not need to be removed for typical applications. If residue removal is desired, the use of Everkleen 1005 Buffered Saponifier with a 5-15% concentration in hot 60 °C (140 °F) will aid in residue removal.

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) 3 months (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.

Packaging

10cc syringe 35 gm

30cc syringe 100 gm

Disposal

DSP 888D should be stored in a sealed container and disposed of in accordance with federal, state and local authority requirements.

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