



**DSP 619D  
(Sn62/Pb36/Ag2)  
NO CLEAN DISPENSING  
SOLDER PASTE**

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**Description**

Delta® Solder Paste 619D is a no clean solder paste designed for surface mount assembly applications using a syringe dispensing method. It is designed for leaded alloys such as the industry standard, Sn63/Pb37 and Sn62/Pb36/Ag2. The post soldering residues of DSP 619D are transparent, pin probable, non-corrosive and non-conductive.

Main Features

- Transparent residue
- Pin testable post solder residue
- Easily dispensable
- Soft, non-conductive residue

**Technical Data**

|                                 | <b>Specification</b>        | <b>Test Method</b>           |
|---------------------------------|-----------------------------|------------------------------|
| <b>Flux Classification</b>      | RELO                        | IPC-J-STD-004B               |
| <b>Copper Mirror</b>            | No removal of copper film   | IPC-TM-650 2.3.32            |
| <b>Corrosion</b>                | Pass                        | IPC-TM-650 2.6.15            |
| <b>SIR</b>                      | >1.0 x 10 <sup>8</sup> ohms | IPC-TM-650 2.6.3.3           |
| <b>Post Reflow Flux Residue</b> | 45%                         | TGA Analysis                 |
| <b>Metal Loading</b>            | 88%                         | IPC-TM-650 2.2.20            |
| <b>Viscosity</b>                |                             |                              |
| Malcom, poise                   | 850-1100                    | IPC-TM-650 2.4.34.3 modified |
| <b>Slump Test</b>               | Pass                        | IPC-TM-650 2.4.35            |
| <b>Solder Ball Test</b>         | Pass                        | IPC-TM-650 2.4.43            |
| <b>Tack</b>                     |                             |                              |
| Initial                         | 85 gm                       | JIS Z 3284                   |
| Tack retention @ 24 hr.         | 67                          | JIS Z 3284                   |
| Tack retention @ 72 hr.         | 50 gm                       | JIS Z 3284                   |

**Physical Properties**

**Solder Composition**

Sn62 alloy is the conventional non-eutectic solder used in most electronic assemblies. The Sn62 alloy conforms and exceeds the impurity requirements of IPC-J-STD-006C and all other relevant international standards.

| <b>Typical Analysis</b> |     |              |              |              |              |              |              |              |              |              |              |              |              |
|-------------------------|-----|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Sn                      | Pb  | Ag           | Al           | As           | Au           | Bi           | Cd           | Cu           | Fe           | In           | Ni           | Sb           | Zn           |
| 61.5<br>-62.5           | Bal | 1.8 –<br>2.2 | 0.005<br>Max | 0.030<br>Max | 0.050<br>Max | 0.100<br>Max | 0.002<br>Max | 0.080<br>Max | 0.020<br>Max | 0.100<br>Max | 0.010<br>Max | 0.200<br>Max | 0.003<br>Max |

|  | <b>Sn62/Pb36/Ag2</b> |
|--|----------------------|
| Melting Point, °C                                | 179 - 189            |
| Hardness, Brinell                                | 14 HB                |
| Coefficient of Thermal Expansion                 | 27.0                 |
| Tensile Strength, psi                            | 4442                 |
| Density, g/cc                                    | 8.50                 |
| Electrical Resistivity, (μohm-cm)                | 14.5                 |
| Electrical Conductivity, 10 <sup>4</sup> /ohm-cm | 6.9                  |

|   | <b>Sn62/Pb36/Ag2</b> |
|---|----------------------|
| Yield Strength, psi                                   | 3950                 |
| Total Elongation, %                                   | 48                   |
| Joint Shear Strength, at 0.1mm/min 20 °C              | 37.0                 |
| Joint Shear Strength, at 0.1mm/min 100 °C             | 16.2                 |
| Creep Strength, N/mm <sup>2</sup> at 0.1mm/min 20 °C  | 3.3                  |
| Creep Strength, N/mm <sup>2</sup> at 0.1mm/min 100 °C | 1                    |
| Thermal Conductivity, W/mK                            | 50.9                 |

**Particle Size**

Sn62/Pb36/Ag2 alloy is available in Type 3(45-25μm) 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 **87.0-88.0 %**.

## Printing of Solder Paste

### Dispensing

| Needle Gauge | Needle inner diameter |     | Applicable powder<br>(mesh cut) |
|--------------|-----------------------|-----|---------------------------------|
|              | in.                   | µm  |                                 |
| 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<sup>2</sup> (1.05-1.76 kg/cm<sup>2</sup>). In cases where a paste requires much higher pressure (more than 40 lb/in<sup>2</sup> or 2.82 kg/cm<sup>2</sup>) 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 619D 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.

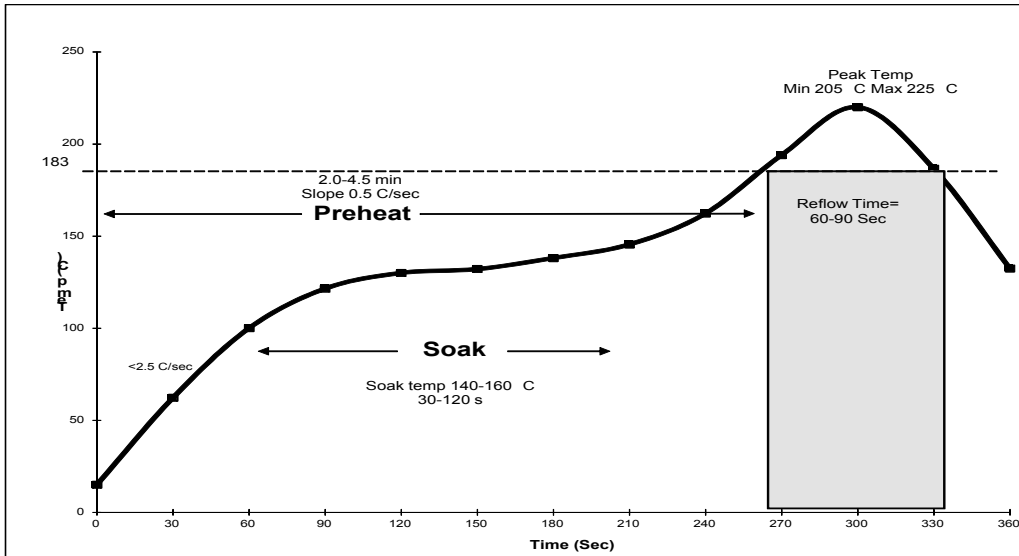
### Paste Application

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 achieved when DSP 619D 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 619D 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 dispensing 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 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 | 35 gm  |
| 30cc | 100 gm |

## **Disposal**

Sn62/Pb36/Ag2 DSP 619D should be stored with the tips facing down and disposed of in accordance with local, regional, national and international regulations.

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