

DSP 619D (Sn63/Pb37) NO CLEAN SOLDER PASTE

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Physical Properties

Solder Composition

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

| Typical Analysis | | | | | | | | | | | | | |
|------------------|------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Sn | Pb | Cu | Ag | Sb | Bi | In | As | Fe | Ni | Cd | Al | Zn | Au |
| 62.5-63.5 | Bal. | 0.030 Max | 0.020 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 |

| | 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 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 **87.0-88.0 %**.

Solder Paste

Delta Solder Paste 619D is a no clean solder paste designed for surface mount applications using a syringe dispensing method. The post soldering residues of DSP619D are transparent, soft, pin probable as well as non-corrosive and non-conductive.

Main Features

- ☐ Transparent residue
- ☐ Pin testable post solder residue
- ☐ Excellent wettability
- ☐ Soft, non-conductive residue

| Flux Classification | Specification | Test Method |
|----------------------------------|------------------------------|------------------------------|
| | RELO | JSTD-004 |
| Copper Mirror | No removal of copper film | IPC-TM-650 2.3.32 |
| Corrosion | Pass | IPC-TM-650 2.6.15 |
| SIR | | |
| JSTD-004 | 1.24 x 10 ¹⁰ ohms | IPC-TM-650 2.6.3.3 |
| Bellcore (Telecordia) | 3.56 x 10 ¹⁰ ohms | Bellcore GR-78-CORE 13.1.3 |
| Electromigration | Pass | Bellcore GR-78-CORE 13.1.4 |
| Post Reflow Flux Residue | 45% | TGA Analysis |
| Acid Value | 110 | IPC-TM-650 2.3.13 |
| Metal Loading | 88% | 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 |
| Slump Test | | |
| 25 °C, 0.63 vertical/horizontal | No bridges all spacings | IPC-TM-650 2.4.35 |
| 150 °C, 0.63 vertical/horizontal | No bridges all spacings | IPC-TM-650 2.4.35 |
| 25 °C, 0.33 vertical/horizontal | 0.20 /0.20 | IPC-TM-650 2.4.35 |
| 150 °C, 0.33 vertical/horizontal | 0.20/0.20 | IPC-TM-650 2.4.35 |
| Solder Ball Test | Pass | IPC-TM-650 2.4.43 |
| Tack | | |
| Initial | 75.5 gm | JIS Z 3284 |
| Tack retention @ 24 hr | 82.0 gm | JIS Z 3284 |
| Tack retention @ 72 hr | 52.5 gm | JIS Z 3284 |

Printing

Dispensing

| Needle Gauge | Needle inner diameter | | Applicable powder (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/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 DSP619D 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.

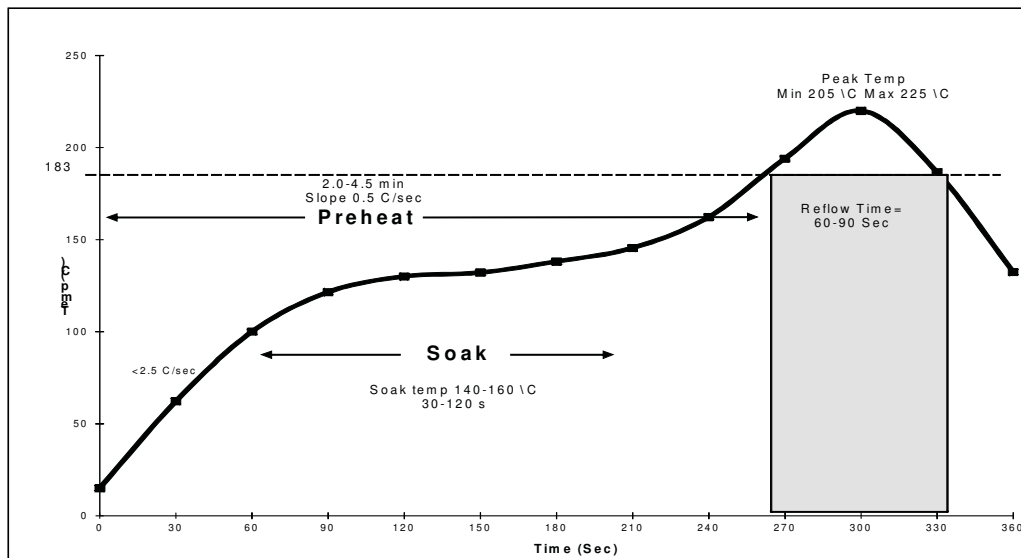
Paste Application

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 DSP619D 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

DSP619D 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) 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.

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.

Disposal

DSP619D should be stored in a sealed container and disposed of in accordance with state & local authority requirements.

Packaging

| | |
|------|--------|
| 10cc | 35 gm |
| 30cc | 100 gm |