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## Data Sheet: 95 Lead-5Tin

### Physical Properties of Bulk Solder

Solder Alloy Composition	95Pb-5Sn (weight per cent)
Melting range	305-314°C
Density	11.32 Mg/m <sup>3</sup>
Thermal conductivity	0.33 W/cm K <sup>-1</sup>
Electrical conductivity	8.8% IACS
Coefficient of Thermal Expansion	28.7 x 10 <sup>-6</sup> K <sup>-1</sup>
Tensile strength (est.)	33 GNm <sup>-2</sup>
Bonding strength	19 GNm <sup>-2</sup>

Typical impurity levels for electronic grade are less than:

Au: 0.05	Ag : 0.05	Cu: 0.08	Ni: 0.01	Al: 0.0005
Bi: 0.001	Fe: 0.02	Zn: 0.0003	As: 0.0003	Cd: 0.002
In: 0.10				

The 95Pb5Sn-alloy is widely used for the manufacture of semiconductor components. It combines a higher melting range, with good mechanical strength and thermal fatigue properties. The 5% tin assures a good wetting to copper leads and Au-flash coated Si-chips in die-attach applications. The melting temperature range is wide enough to permit two-or even three-step soldering. The higher melting range makes the alloy also very suitable for fluxless soldering in an inert or reducing atmosphere.

The 5% Sn solder is used extensively in the assembly of diodes and rectifiers in belt furnaces with a forming gas mixture (N<sub>2</sub>, H<sub>2</sub>) or cracked anhydrous ammonia (75%H<sub>2</sub>, 25%N<sub>2</sub>).

**Application:** Soldering temperature profile for flux-less, reflow applications should include: minimal at or above 360°C for a minimal time of 20 seconds. This assumes either very clean, soldering surfaces or the presence of a reducing- or inert-atmosphere during the soldering cycle. Alternatively, the alloy can be reflowed below 360°C when special conditions for substrates (i.e. Au-plating over Ni-) and longer temperatures above melting point are being met.

If and when the components are slightly oxidized, a combination of higher temperatures and/or longer soldering temperatures is required. When forming gas can be used, the temperature profile can usually be kept shorter. In such situation, the peak temperature of the profile can be lowered to 345°C for a minimal time of 240 seconds above melting point of 305°C.

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