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ELECTRONIC COMPONENTS
AND PACKAGING

Data Sheet: 77.1 Tin-20 Indium-2.8 Silver-.1 Germanium

Physical Properties of Bulk Solder

Solder Alloy Composition	Sn77.1In20Ag2.8Ge.1 (weight per cent)
Solidus	175°C
Liquidus	187°C
Density	7.36 Mg/m ³
Coefficient of Thermal Expansion	23 x 10 ⁻⁶ K ⁻¹ (est.)
Young's Modulus	27 Nmm ⁻² (est.)
Hardness	14 HV (est.)
Thermal Conductivity	55 W m ⁻¹ K ⁻¹ ((est.)
Electrical Conductivity	12% IACS (est.)
Electrical Resistivity	13 μΩ cm (est.)

Typical impurity levels for electronic grade are less than:

Au: 0.05	Cu: 0.08	Ni: 0.01	Al: 0.005
Bi: 0.10	Fe: 0.02	Zn: 0.003	As: 0.03
Cd: 0.002	Pb: < 0.10		

Soldering temperature for reflow should be minimal at or above 225°C for a minimal time of 20 seconds. This assumes either very clean, soldering surfaces and an inert or reducing atmosphere or the presence of a deoxidizing agent/flux during the soldering cycle. If and when the components are slightly oxidized, a combination with higher temperatures and/or longer soldering temperatures is required. For more oxidized surfaces, an appropriate flux must be used.

Due to the 20% In for lowering the melting range, the wettability of the alloy is quickly reduced due to presence of indium-oxides on the solder surface. Thanks to the addition of the .1% Ge, the wettability properties have been enhanced by the building of a protective mainly Ge-oxide surface layer.

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