

LEAD-FREE AND ANTIMONY-FREE SOLDER ALLOY, SOLDER BALL, AND SOLDER JOINT

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Abstract

Provided are a lead-free and antimony-free solder alloy, a solder ball, and a solder joint in which crystal grains at a joining interface are micronized, thereby improving shear strength and making it possible to suppress fusion failure. The lead-free and antimony-free solder alloy has an alloy composition containing, in terms of mass%, 0.1 – 4.5% of Ag, 0.20 – 0.85% of Cu, 0.2 – 5.00% of Bi, 0.005 – 0.09% of Ni, and 0.0005 – 0.0090% of Ge with the balance being Sn. The alloy composition satisfies the following formulas (1) and (2). Formula (1): $0.013 \leq (\text{Ag} + \text{Cu} + \text{Ni} + \text{Bi}) \times \text{Ge} \leq 0.027$ Formula (2): $\text{Sn} \times \text{Cu} \times \text{Ni} \leq 5.0$. In formulas (1) and (2), Ag, Cu, Ni, Bi, Ge, and Sn represent the element contents (mass%) for the respective elements of the alloy composition.

[No Figure]