[TITLE OF DOCUMENT] CLAIMS

[Claim 1]

A soldering alloy comprising an alloy composition consisting of 13-22 mass% of In, 0.5-2.8 mass% of Ag, 0.5-5.0 mass% of Bi, 0.002-0.05 mass% of Ni, optionally at least one selected from P, Ge and Ga in total of 0.09 mass% or less, optionally 0.005-0.1 mass% of Sb, a balance Sn and unavoidable impurities; wherein

the content of In, Ag, Bi, and Ni satisfies the following equation (1),

$0.9 \leqq (In \times Ni) \times (Ag+Bi) \leqq 3.4$ (1)

wherein, in the equation (1), In, Ni, Ag, and Bi represent each content of the respective elements.

[Claim 2]

The soldering alloy according to any one of claims 1, wherein the content of In is 15-20%.

[Claim 3]

The soldering alloy according to claim 2, wherein an upper limit of the content of In is 17%.

[Claim 4]

The soldering alloy according to any one of claims 1 to 3, wherein the content of Ag is 1.0-2.5%.

[Claim 5]

The soldering alloy according to any one of claims 1 to 4, wherein the content of Bi is 1.0-2.5%.

[Claim 6]

The soldering alloy according to any one of claims 1 to 5, wherein the content of Ni is

0.003-0.04%.

[Claim 7]

The soldering alloy according to any one of claims 1 to 6, wherein a solidus temperature is 160°C or more and a liquidus temperature is 210°C or less.

[Claim 8]

The soldering alloy according to claim 7, wherein the solidus temperature is 165°C or higher and the liquidus temperature is 200°C or lower.

[Claim 9]

A soldering paste consisting of the soldering alloy according to any one of claims 1 to 8.

[Claim 10]

A preform solder consisting of the soldering alloy according to any one of claims 1 to 8.

[Claim 11]

A soldering ball consisting of the soldering alloy according to any one of claims 1 to 8.

[Claim 12]

A wire solder consisting of the soldering alloy according to any one of claims 1 to 8.

[Claim 13]

A resin flux cored solder consisting of the soldering alloy according to any one of claims 1 to 8.

[Claim 14]

A solder joint consisting of the soldering alloy according to any one of claims 1 to 8, wherein the solder joint does not include a soldering alloy other than soldering alloy according to any one of claims 1 to 8.

[Claim 15]

An electronic circuit board comprising an electronic part joined by using the solder joint

according to claim 14.

[Claim 16]

The electronic circuit board according to claim 15, further comprising a high thermal resistance electronic part which has a higher thermal resistance temperature than the electronic part,

wherein the high thermal resistance electronic part is joined by using another alloy having a melting point higher than the liquidus temperature of the soldering alloy included in the solder joint.

[Claim 17]

The electronic circuit board according to claim 15, further comprising a low thermal resistance electronic part which has a lower heat resistance temperature than the electronic part,

wherein the low thermal resistance electronic part is joined by using another solder joint including another soldering alloy having a melting point lower than the solidus temperature of the soldering alloy.

[Claim 18]

A multi-layer electronic circuit board, comprising:

a first board including an electronic part joined by using the solder joint according to claim 14; and

a second board including a high thermal resistance electronic part which is laminated on the first board and has a higher thermal resistance temperature than the electronic part,

wherein the high thermal resistance electronic part and the second board are joined by using another solder joint including another soldering alloy having a melting point higher than the liquidus temperature of the soldering alloy included in the solder joint.

[Claim 19]

A multi-layer electronic circuit board, comprising:

a first board including an electronic part joined by using the solder joint according to claim 14; and

a second board including a low thermal resistance electronic part which is laminated on the first board and has a lower thermal resistance temperature than the electronic part,

wherein the low thermal resistance electronic part and the second board are joined by using another solder joint including another soldering alloy having a melting point lower than the solidus temperature of the soldering alloy included in the solder joint.