CLAIMS

1. A lead-free solder alloy comprising:

3.1 to 3.8 wt. % silver;

0.5 to 0.9 wt. % copper;

0.0 to 3.2 wt. % bismuth;

0.03 to 0.2 wt. % cobalt;

0.005 to 0.02 wt. % titanium;

1.0 to 3.0 wt. % antimony and

balance tin, together with any unavoidable impurities.

2. The lead-free solder alloy of claim 1, further comprising 0.01 to 0.1 wt. % nickel.

3. The lead-free solder alloy of claim 2, comprising 0.05 wt. % nickel.

4. The lead-free solder alloy of claim 1, comprising 3.8 wt. % silver.

5. The lead-free solder alloy of claim 1, comprising 0.7 wt. % copper.

6. The lead-free solder alloy of claim 1, comprising 1.5 to 3.2 wt. % bismuth.

7. The lead-free solder alloy of claim 6, comprising 1.5 wt. % bismuth.

8. The lead-free solder alloy of claim 6, comprising 3.0 wt. % bismuth.

9. The lead-free solder alloy of claim 1, comprising 0.03 to 0.05 wt. % cobalt.

10. The lead-free solder alloy of claim 9, comprising 0.05 wt. % cobalt.

11. The lead-free solder alloy of claim 1, comprising 0.008 wt. % titanium.

12. A lead-free solder alloy consisting of:

3.1 to 3.8 wt. % silver;

0.5 to 0.8 wt. % copper;

0.0 to 5.0 wt. % bismuth;

0.05 to 1 .0 wt. % cobalt;

1 .0 to 3.0 wt. % antimony;

0.005 to 0.02 wt. % titanium; and

balance tin, together with any unavoidable impurities.

13. The lead-free solder alloy of claim 12, further comprising 0.01 to 0.1 wt. % nickel.

14. The lead-free solder alloy of claim 13, comprising 0.05 wt. % nickel.

15. The lead-free solder alloy of claim 12, comprising 3.8 wt. % silver.

16. The lead-free solder alloy of claim 12, comprising 0.8 wt. % copper.

17. The lead-free solder alloy of claim 12, comprising 1 .5 to 3.2 wt. % bismuth.

18. The lead-free solder alloy of claim 17, comprising 1 .5 wt. % bismuth.
19. The lead-free solder alloy of claim 17, comprising 3.0 wt. % bismuth.
20. The lead-free solder alloy of claim 12, comprising 0.05 wt. % cobalt.
21. The lead-free solder alloy of claim 12, comprising 1 .0 wt. % antimony.
22. The lead-free solder alloy of claim 12, comprising 1 .5 wt. % antimony.
23. The lead-free solder alloy of claim 12, comprising 0.008 wt. % titanium.