

WHAT IS CLAIMED IS:

1. A method for producing a bump-formed plate-like member used for producing an electronic component obtained by encapsulating at least one chip in a resin, the bump-formed plate-like member being provided with at least one bump on one side, the method comprising:

molding the plate-like member and the at least one bump at a same time by molding using a molding die, wherein

the at least one bump is at least one electrode of the electronic component,

the molding is performed by electroforming, and

the molding die is a molding die produced by molding using a master die.

2. A method for producing a bump-formed plate-like member used for producing an electronic component obtained by encapsulating at least one chip in a resin, the bump-formed plate-like member being provided with at least one bump on one side, the method comprising:

molding the plate-like member and the at least one bump at a same time by molding using a molding die, wherein

the at least one bump is at least one electrode of the electronic component,

the molding is performed by electroforming,

the molding die is a molding die produced by molding using a master die,

the molding die is divided into plural pieces and the molding is performed in a state where the divided pieces are assembled as a molding die, and

the bump-formed plate-like member is taken out from the molding die by melting the divided pieces after the molding.

3. A method for producing a bump-formed plate-like member used for producing an electronic component obtained by encapsulating at least one chip in a resin, the bump-formed plate-like member being provided with at least one bump on one side, the method comprising:

molding the plate-like member and the at least one bump at a same time by molding using a molding die, wherein

the at least one bump is at least one electrode of the electronic component,

the molding is performed by compression molding, and
the molding is performed using a conductive resin.

4. A method for producing a bump-formed plate-like member used for
5 producing an electronic component obtained by encapsulating at least one chip in a
resin, the bump-formed plate-like member being provided with at least one bump on
one side, the method comprising:

molding the plate-like member and the at least one bump at a same time by
molding using a molding die, wherein

10 the at least one bump is at least one electrode of the electronic component,
the molding is performed by transfer molding, and
the molding is performed using a conductive resin.

5. A method for producing a bump-formed plate-like member used for
15 producing an electronic component obtained by encapsulating at least one chip in a
resin, the bump-formed plate-like member being provided with at least one bump on
one side, the method comprising:

molding the plate-like member and the at least one bump at a same time by
molding using a molding die, wherein

20 the at least one bump is at least one electrode of the electronic component,
and

the molding is performed using a resin, and the method further comprises:
applying a conductive film to a surface of the at least one bump and a
bump-formed surface of the bump-formed plate-like member.

25
30 ~~2. The method according to claim 1, wherein~~
~~the molding is performed by electroforming.~~

36. The method according to any one of claims 21 to 5, wherein
the at least one bump includes a deformable portion.

4. ~~The method according to claim 2 or 3, wherein~~
~~the molding die is a molding die produced by molding using a master die.~~

57. The method according to claim 41, wherein
the molding die is divided into plural pieces and the molding is performed in
a state where the divided pieces are assembled as a molding die.

68. The method according to claim 52 or 7, wherein
the molding die is divided into plural pieces substantially in parallel with a
plane direction of the plate-like member.

7. ~~The method according to claim 1, wherein
the molding is performed by compression molding.~~

8. ~~The method according to claim 1, wherein
the molding is performed by transfer molding.~~

9. The method according to claim 7 or 8, wherein
the molding die is a resin die.

910. The method according to any one of claims 1, 2 and 7 to 98, wherein
the molding is performed using a metal.

1011. The method according to any one of claims 1, 2 and 7 to 98, wherein
the molding is performed using a conductive resin.

1112. The method according to any one of claims 3, 4 and 11-10, wherein
the conductive resin is a mixture of a resin and a conductive particle.

1213. The method according to any one of claims 1, 2 and 7 to 98, wherein
the molding is performed using a resin, and the method further comprises:
applying a conductive film to a surface of the at least one bump and a
bump-formed surface of the bump-formed plate-like member.

1314. The method according to any one of claims 1 to ~~1312~~, wherein
the molding die has a die surface corresponding to a shape of the
bump-formed surface of the bump-formed plate-like member and at least one hole
corresponding to a shape of the at least one bump on the die surface, and
5 the molding is performed by bringing a material for forming the
bump-formed plate-like member into contact with the die surface and an inner
surface of the at least one hole.

1415. The method according to any one of claims 1 to ~~1312~~, wherein
10 the molding die has a die surface corresponding to a shape of the
bump-formed surface of the bump-formed plate-like member and at least one
projection corresponding to a shape of the at least one bump on the die surface, and
the molding is performed by bringing a material for forming the
bump-formed plate-like member into contact with the die surface and a surface of
15 the at least one projection.

1516. The method according to any one of claims 1 to ~~1514~~, wherein
the at least one bump has a tapered shape formed to be thinner in diameter
toward its end.

20 1617. A bump-formed plate-like member produced by the method according to any
one of claims 1 to ~~1615~~.

25 1718. The bump-formed plate-like member according to claim 16, wherein
the at least one bump includes a deformable portion.

30 1819. The bump-formed plate-like member according to claim 1617, wherein
the at least one bump is a zigzag bump, and
in the zigzag bump, the deformable portion is configured to be shrunk in a
direction perpendicular to the plane direction of the plate-like member by zigzag
bending of at least the deformable portion as viewed in a direction parallel with the
plane direction of the plate-like member.

~~19~~20. The bump-formed plate-like member according to any one of claims ~~16~~17 to ~~18~~19, wherein

the at least one bump has a through hole penetrating in a direction parallel with the plane direction of the plate-like member, and

the at least one bump having a through hole has a projection projecting at the end opposite to an end formed in the plate-like member in a direction perpendicular to a plate surface of the plate-like member.

~~20~~21. The bump-formed plate-like member according to claim ~~19~~20, wherein the deformable portion surrounds the through hole.

~~21~~22. The bump-formed plate-like member according to any one of claims ~~16~~17 to ~~20~~21, wherein

the at least one bump is a columnar bump.

~~22~~23. The bump-formed plate-like member according to any one of claims ~~16~~17 to ~~21~~22, wherein

the at least one bump may be a plate-like bump.

~~23~~24. The bump-formed plate-like member according to claim ~~22~~23, wherein

the plate-like bump has a through hole and a projection,

the through hole penetrates the plate-like bump in a direction parallel with a plate surface of the plate-like member, and

the projection projects at the end opposite to an end formed in the plate-like member in a direction perpendicular to the plate surface of the plate-like member.

~~24~~25. The bump-formed plate-like member according to claim ~~23~~24, wherein

the deformable portion surrounds the through hole of the plate-like bump.

~~25~~26. The bump-formed plate-like member according to any one of claims ~~16~~17 to ~~24~~25, wherein

the plate-like member is a heat radiation plate or a shield plate.

2627. The bump-formed plate-like member according to any one of claims 1617 to 2526, wherein

the plate-like member includes a resin containing portion.

2728. The bump-formed plate-like member according to claim 2627, wherein the plate-like member has a protuberance at a peripheral edge on a bump-formed surface side of the plate-like member to form the resin containing portion in a central portion of the plate-like member.

2829. A method for producing an electronic component comprising: a substrate, at least one chip, a resin, ~~a plate-like member having at least one surface, at least one bump, a bump-formed plate-like member produced by the method according to any one of claims 1 to 16,~~ and a wiring pattern, the method for producing the electronic component comprising:

disposing the at least one chip on the surface; and encapsulating the at least one chip in the resin, wherein the encapsulating comprises:

encapsulating the at least one chip in the resin between a bump-formed surface of the bump-formed plate-like member ~~according to any one of claims 16 to 27~~ and a wiring pattern-formed surface of the substrate on which the wiring pattern is formed; and

bringing the at least one bump into in contact with the wiring pattern.

2930. The method according to claim 2829, wherein the at least one bump is a plate-like bump, the electronic component comprises a plurality of chips, and the encapsulating comprises:

partitioning the substrate into plural regions with the plate-like bump; and

encapsulating the chips in the resin in the plural regions.

3031. The method according to claim 2829 or 2930, wherein the encapsulating is performed by transfer molding.

3132. The method according to claim 2829 or 2930, wherein the encapsulating is performed by compression molding.

3233. The method according to claim 3132, further comprising:
placing the resin on the bump-formed surface of the bump-formed plate-like member; and
transferring the bump-formed plate-like member to a die cavity of a molding die, wherein
the encapsulating is performed by compression molding of the resin in the die cavity together with the bump-formed plate-like member and the at least one chip in a state where the at least one chip is immersed in the resin placed on the plate-like member.

3334. The method according to claim 3233, wherein the transferring the bump-formed plate-like member comprises:
transferring the resin to the die cavity of the molding die together with the bump-formed plate-like member in a state where the resin is placed on the bump-formed plate-like member.

3435. The method according to claim 3233, further comprising:
heating the bump-formed plate-like member in the die cavity prior to the placing the resin, wherein
the transferring the bump-formed plate-like member comprises:
transferring the bump-formed plate-like member to the die cavity of the molding die in a state where the resin is not placed on the bump-formed plate-like member, and
the placing the resin is performed in the die cavity in a state where the bump-formed plate-like member is heated.

3536. The method according to any one of claims 3233 to 3435, wherein the transferring the bump-formed plate-like member comprises:
transferring the bump-formed plate-like member to the die cavity of the molding die in a state where the bump-formed plate-like member is placed on a release film so as to face the bump-formed surface upward.

3637. The method according to claim 3536, wherein the transferring the bump-formed plate-like member comprises:
placing a frame on the release film together with the bump-formed plate-like member; and
transferring the bump-formed plate-like member to the die cavity of the molding die in a state where the bump-formed plate-like member is surrounded by the frame.

3738. The method according to claim 3637, wherein the placing the resin comprises:
placing the resin on the bump-formed surface by supplying the resin to a space surrounded by the bump-formed plate-like member and the frame in a state where the frame is placed on the release film together with the bump-formed plate-like member and the bump-formed plate-like member is surrounded by the frame.

3839. The method according to claim 3637, wherein the placing the resin is performed prior to the transferring the bump-formed plate-like member.

3940. The method according to any one of claims 3536 to 3839, wherein a surface of the bump-formed plate-like member opposite to the bump-formed surface is fixed on the release film by a pressure-sensitive adhesive.

4041. The method according to any one of claims 3233 to 3940, wherein the plate-like member includes a resin containing portion, the placing the resin comprises:

placing the resin in the resin containing portion, and
the encapsulating is performed in a state where the resin is placed in the
resin containing portion.

- 5 | 4142. The method according to any one of claims ~~3132~~ to ~~4041~~, wherein
the encapsulating comprises:
placing the substrate having the wiring pattern-formed surface on
which the at least one chip is disposed on a substrate placement stage so as
to face the wiring pattern-formed surface upward; and
10 | pressing the resin in a state where the resin is placed on the wiring
pattern-formed surface.
- | 4243. The method according to any one of claims ~~2829~~ to ~~4142~~, wherein
the plate-like member is a heat radiation plate, and
15 | the heat radiation plate includes a heat radiation fin on a surface opposite to
the bump-formed surface.
- | 4344. The method according to any one of claims ~~2829~~ to ~~4243~~, wherein
the resin is a thermoplastic resin or a thermosetting resin.
20 |
- | 4445. The method according to any one of claims ~~2930~~ to ~~4344~~, wherein
the resin is at least one selected from the group consisting of a granular
resin, a powdery resin, a liquid resin, a plate-like resin, a sheet-like resin, a film-like
resin, and a paste-like resin.
25 |
- | 4546. The method according to any one of claims ~~2930~~ to ~~4445~~, wherein
the resin is at least one selected from the group consisting of a transparent
resin, a semi-transparent resin, and an opaque resin.
- 30 | 4647. An electronic component, comprising:
a substrate;
at least one chip;
a resin; and

~~thea bump-formed plate-like member according to any one of claims 16 to 27~~
produced by the method according to any one claims 1 to 16, wherein

the at least one chip is disposed on the substrate and encapsulated in the resin,

5 a wiring pattern is formed on the substrate on a side on which the at least one chip is disposed, and

the at least one bump penetrates the resin and is in contact with the wiring pattern.

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