What is claimed is:

(1) A liquid resin composition comprising (A) an epoxy resin component and (B) a curing agent component, where the epoxy resin component (A) being liquid at room temperature, and the curing agent component (B) including (B1) a compound which has phenolic hydroxyl group(s) and is dissolvable in the epoxy resin component (A), and (B2) a compound which has phenolic hydroxyl group(s) and is not dissolvable in the epoxy resin component (A).

(2) The liquid resin composition according to (1), which is tack free at room temperature, but tacky at temperature of equal to or higher than the first temperature, after being heated at a first temperature.

(3) The liquid resin composition according to (1) or (2), wherein both the compound (B1) and the compound (B2) have two or more phenolic hydroxyl groups in the molecule.

(4) A semiconductor wafer or a semiconductor chip with an adhesive layer, where the adhesive layer is pre-applied and formed onto the semiconductor wafer or the semiconductor chip by using the liquid resin composition according to any one of (1) to (3), followed by heating the semiconductor wafer or the semiconductor chip at the first temperature.

(5) A semiconductor chip with an adhesive layer produced by dicing the semiconductor wafer with an adhesive layer according to (4).

(6) A semiconductor device comprising the semiconductor chip with an adhesive layer according to (4) or (5) and a carrier, where the semiconductor chip is bonded.

(7) A method of producing a semiconductor wafer with an adhesive layer, by applying the liquid resin composition, according to any one of (1) to (3), to one side of a semiconductor wafer; a method of forming an adhesive layer, by heating at a first temperature, which is tack free at room temperature but tacky at temperature of equal to

or higher than the first temperature; a method of laminating the semiconductor wafer with the adhesive layer to a dicing sheet; a method of producing the semiconductor chip with the adhesive layer, by dicing the semiconductor wafer with the adhesive layer into individual semiconductor chips with the adhesive layer.

(8) A method of producing a semiconductor device, by bonding the semiconductor chip with the adhesive layer, according to (7), to carrier with heat & pressure.

What is claimed is:

[Claim 1]

A semiconductor wafer having an adhesive layer or a semiconductor element having an adhesive layer, the adhesive layer being formed on the semiconductor wafer or the semiconductor element by applying a liquid resin composition to the semiconductor wafer or the semiconductor element, and heating the semiconductor wafer or the semiconductor element at a heating temperature of 60 to 150°C, the liquid resin composition comprising (A) an epoxy resin component and (B) a curing agent component, the epoxy resin component (A) being liquid at room temperature, the curing agent component (B) including (B1) a compound that has a phenolic hydroxyl group, and has a softening point or a melting point of 200°C or less, and (B2) a compound that has a phenolic hydroxyl group, and has a melting point of more than 200°C, the compound (B1) being characterized in that a transparent mixture is observed when charging a 300 cc separable flask with 90 g of the epoxy resin component (A) and 10 g of the compound (B1), heating the mixture in an oil bath with stirring using a stirrer so that the internal temperature is 145 to 155°C, stirring the mixture for 30 minutes after the internal temperature has reached 145°C, cooling the mixture to room temperature, allowing the mixture to stand at 25°C for 72 hours, and observing the mixture with the naked eye, and the compound (B2) being characterized in that a transparent mixture is not observed when charging a 300 cc separable flask with 90 g of the epoxy resin component (A) and 10 g of the compound (B2), heating the mixture in an oil bath with stirring using a stirrer so that the internal temperature is 145 to 155°C, stirring the mixture for 30 minutes after the internal temperature has reached 145°C, cooling the mixture to room temperature, allowing the mixture to stand at 25°C for 72 hours, and observing the mixture with the naked eye.

[Claim 2]

The semiconductor wafer having an adhesive layer or the semiconductor element having an adhesive layer according to claim 1, wherein each of the compound (B1) and the compound (B2) has two or more phenolic hydroxyl groups in the molecule.

[Claim 3]

A semiconductor element having an adhesive layer produced by dicing the semiconductor wafer having an adhesive layer according to claim 1 or 2.

[Claim 4]

A semiconductor device comprising the semiconductor element having an adhesive layer according to any one of claims 1 to 3, and a circuit board, the semiconductor element being mounted on the circuit board.

[Claim 5]

A method of producing a semiconductor element having an adhesive layer, the method comprising an application step of applying a liquid resin composition to one side of a semiconductor wafer, an adhesive layer formation step of heating the semiconductor wafer to which the liquid resin composition is applied at a heating temperature of 60 to 150°C to form an adhesive layer, an attachment step of attaching the semiconductor wafer having the adhesive layer to a dicing sheet, and a dicing step of dicing the semiconductor wafer having the adhesive layer into individual semiconductor elements having the adhesive layer, the liquid resin composition comprising (A) an epoxy resin component and (B) a curing agent component, the epoxy resin component (A) being liquid at room temperature, the curing agent component (B) including (B1) a compound that has a phenolic hydroxyl group, and has a softening point or a melting point of 200°C or less, and (B2) a compound that has a phenolic hydroxyl group, and has a melting point of more than 200°C, the compound (B1) being characterized in that

a transparent mixture is observed when charging a 300 cc separable flask with 90 g of the epoxy resin component (A) and 10 g of the compound (B1), heating the mixture in an oil bath with stirring using a stirrer so that the internal temperature is 145 to 155°C, stirring the mixture for 30 minutes after the internal temperature has reached 145°C, cooling the mixture to room temperature, allowing the mixture to stand at 25°C for 72 hours, and observing the mixture with the naked eye, and the compound (B2) being characterized in that a transparent mixture is not observed when charging a 300 cc separable flask with 90 g of the epoxy resin component (A) and 10 g of the compound (B2), heating the mixture in an oil bath with stirring using a stirrer so that the internal temperature is 145 to 155°C, stirring the mixture for 30 minutes after the internal temperature has reached 145°C, cooling the mixture to room temperature, allowing the mixture to stand at 25°C for 72 hours, and observing the mixture with the naked eye.

[Claim 6]

A method of producing a semiconductor device, the method comprising thermocompression-bonding a semiconductor element having an adhesive layer produced by the method according to claim 5 to a circuit board.