Title (en)

POWER MODULE, ELECTRICAL DEVICE AND METHOD FOR PRODUCING A POWER MODULE

Title (de)

LEISTUNGSMODUL, ELEKTRISCHES GERÄT UND VERFAHREN ZUR HERSTELLUNG EINES LEISTUNGSMODULS

Title (fr)

MODULE DE PUISSANCE, APPAREIL ÉLECTRIQUE ET PROCÉDÉ POUR PRODUIRE UN MODULE DE PUISSANCE

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Application

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Abstract (en)

[origin: WO2022174955A1] The invention relates to a power module (1) comprising a substrate (2), an electrically conductive intermediate layer (3) which is arranged on the substrate (2) and which has a joining region (4) produced by means of sintering, and at least one power component (5) which is arranged on the intermediate layer (3) and the sintered joining region (4) and is connected thereto (in particular at the load connection of the power component (5)) and which has at least one connection point (6) (e.g. a control connection) connected to the intermediate layer (3), wherein the intermediate layer (3) has, in the region of the associated connection point (6), a solder region (7) produced by means of a solder preform and spaced and/or electrically insulated from the sintered joining region (4). The large active surface, which is subjected to high thermomechanical stress in the service life test, can therefore be connected via the sintered joining region (4), which ensures an especially long-lasting, reliable and resilient mechanical connection between the associated power component (5) and the substrate (2). At the associated connection point (6), e.g. the gate of a transistor, the thermomechanical stress is usually much less, which is why there in the intermediate layer (3) a solder preform can be used for producing the connection between the associated power component (5) and the substrate (2), such solder preforms being relatively cost-effectively obtainable. Furthermore, an electrical device (10) has at least one such power module (1). The joining region (4) produced by means of sintering can be formed by means of a sinter preform or by means of 3D printing, by means of a coating method or by means of screen printing/stencil printing. In the method for producing the power module (1), the intermediate layer (3) can be heated to the melting temperature of the solder if the melting temperature of the solder is higher than the sintering temperature or to the sintering temperature if the sintering temperature is higher than the melting temperature of the solder, and the layer thickness (9) of the sintering material for the joining region (4) produced by means of sintering can be larger or smaller than the layer thickness (9) of the solder for the associated solder region (7) if the sintering temperature is correspondingly lower or higher than the melting temperature of the solder. Alternatively, the melting temperature of the solder can be substantially the same as the sintering temperature, and the layer thickness (9) of the sintering material for the joining region (4) produced by means of sintering can be substantially the same as the layer thickness (9) of the solder for the associated solder region (7). The sintered joining region (4) can have a sintering core (4") which is in the form of solid material and which has, on each of its two sides, i.e. facing the power component (5) and facing the substrate (2), a sintering material (4'); also envisageable would be a layered, sintered joining region (4) in which sintering material and solid material alternate layer-by-layer, i.e. sintering material-solid material-sintering material-solid material-sintering material.

IPC 8 full level

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