

A New Via Hole Structure for Power GaAs MESFET's and MMIC

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Abstract: A New Via Hole Structure made by the laser beam technique has been developed. A 1.2mm gate width GaAs power MESFET and an experimental MMIC were fabricated with this method, thus the availability of this new via hole structure has been verified.

Summary

The via hole structure used as a low inductance ground structure has got important application in the power GaAs MESFET's as well as MMIC. However, the conventional via hole structure is made by chemical etching, then the thickness of the wafer would be thinned to about 50um or thinner, and it reduces the process yield and causes deterioration of the performance of some MMIC. In this paper a new structure is described, a fine via hole array can be performed on GaAs substrate according to the desire of design, the chip thickness can be selected arbitrarily, and as a test, this new method has been used to fabricate the x-band power GaAs MESFET as well as MMIC.

The new via hole structure is performed by laser beam technique combined with electro-plating. Using that we have made conductive via hole array on the 0.5-0.7mm thick GaAs wafer where desired and the diameter of the hole is 30-50um. We have fabricated 1.2mm gate width experimental device with this new via hole structure as well as advanced ion-implanted planar structure and air bridge source area interconnection. The devices have excellent dc and rf performance, at 10GHz. We have obtained more than 0.7W output power with associated power gain 5-6dB. We have also fabricated a experimental x-band power MMIC with the same technique and have got similar results as in the power FET. Then the availability of this new via hole structure has been verified. It could be expected that the higher yield and the better microwave performance will be obtained by this new via hole structure.