Silicon based semiconductor devices are rapidly approaching the theoretical limit of operation and are becoming unsuitable for future military requirements. The scope of semiconductor devices has been expanded by wide bandgap devices such as gallium nitride (GaN) to include the possibility for high power and high frequency operation. A new generation of high speed â€“ high frequency devices is required to meet current and future military needs. The Gallium Nitride High Electron Mobility Transistor (HEMT) is showing great promise as the enabling technology in the development of military radar systems, electronic surveillance systems, communications systems and high voltage power systems. Typically, sapphire or silicon carbide is utilized as the substrate material in most HEMT designs. This thesis explores the possibility of utilizing a diamond substrate to increase the power handling capability of the AlGaN/GaN HEMT. Diamond offers increased thermal property parameters that can be simulated in the commercially available Silvaco software package. A complete electrical and thermal analysis of the model was conducted and compared to actual device characteristics. The results of the software simulation and measurements on the test devices indicate diamond substrates will enable the HEMT to be operated at a higher power than traditional sapphire substrate HEMTS.

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TITLE AND SUBTITLE: Development of AlGaN/GaN High Electron Mobility Transistors (HEMTs) on. Diamond Substrates. 6. AUTHOR(S) Wesley Scott Newham. Development of AlGaN/GaN High Electron Mobility Transistors (HEMTs) on Diamond Substrates eBook: Wesley Scott Hewham: hungrydads.com: Kindle Store.

The cross-section view of AlGaN/GaN HEMT on diamond substrate in this . The developed model is embedded into Keysight Advance Design . â€œHigh electron mobility transistor based on a AlxGa1-xN/GaN heterojunction.

Gallium Nitride, HEMT, High Electron Mobility Transistor, Silvaco, ATLAS, .. The development of wide bandgap semiconductors such as Gallium Nitride show that for high power and reliability, GaN HEMTs on diamond substrates should . modeling of AlGaN/GaN HEMT devices using SILVACO ATLASTM software. in gallium-nitride (GaN) high-electron-mobility transistors (HEMT), By inserting this newly developed AlGaN spacer layer in InAlGaN HEMTs, Fujitsu diamond substrate bonding technology Fujitsu developed in , the. of an AlGaN/GaN high-electron-mobility-transistor (HEMT) structure, which was The evolution of wafer curvature induced by substrate thinning and stress.

AlGaN/GaN high electron mobility transistors (HEMTs) are promising device for high power by using high thermal conducting Diamond and SiC substrate materials [11]. model for graded (Al composition) AlGaN/GaN HEMT is developed. We fabricated a high-performance AlGaN/GaN high electron mobility transistor (HEMT), and the transport property was proven to be enhanced by applying an.