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# Gallium Nitride Transistor in continuous wave RF applications

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Gallium nitride (GaN) RF transistors have higher power handling capacity, higher efficiency and higher operation frequency compared with silicon RF transistors, which makes GaN device a better choice for continuous wave (CW) RF applications. Due to low yield in device fabrication, GaN transistors used to have a much higher price than silicon ones. As a result, high power RF source using GaN devices is only seen in the most demanding applications. Development in GaN transistor fabrication technology in the last 5 years largely reduced the price of GaN devices. Nowadays, cost of L-Band GaN devices are at about the same level as the silicon equivalents, which makes GaN CW RF design an economically competitive solution. In this paper a design using GaN transistors is presented for the proposed LCLS-II RF source. Capital cost and operational cost of both GaN and Si designs are compared. The estimation suggests a reduction of 32% in both capital and operational cost by adopting the GaN technology. GaN solution also enables amplifier topology with high efficiency, which will reduced the operational cost by 47% compared with solution using Si devices.

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