

PHOTOSWITCH-BASED CLASS E MICROWAVE POWER AMPLIFIER

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ABSTRACT

Currently radar systems have problems with power losses and efficiency, so more power is used and more heat removal is needed. The primary source of loss is the final amplifier in the transmission-receive (TR) module. The purpose of this project was to investigate the use of a novel Class E amplifier operating at 10 GHz.

The Class E amplifier was studied because of its simplicity and excellent high frequency characteristics. Photoswitches were considered for the active device instead of transistors because they have fast turn-on and turn-off times, low on-state resistance, and large off state resistance. Simulations showed that by using this approach one can design an amplifier with anode efficiency of 80.1% or power added efficiency of 59.3% at 10 GHz.

Analysis of the photoswitch showed that it is possible to design a photoswitch with fast switching times and low on-state resistance, and that this same photoswitch will produce the best operating efficiency when used in the Class E amplifier.