A Class-F amplifier for an EER transmitter has been developed and implemented. This class of operation in combination with GaN-HEMT technology provides high power, high efficiency and wide bandwidth.

**Envelope Elimination and Restoration Technique (EER)**

- High efficiency topology
- High linearity technique

**Class F Amplifier Operation**

- **Biharmonic Class F**
  - \( Z @ f_0 = \frac{8}{\pi} V_{in} \) at virtual drain
  - \( Z @ 2f_0 = 0 \) at virtual drain
  - \( Z @ 3f_0 = \infty \) at virtual drain
  - \( \eta_{max} = \frac{9}{4} \approx 88.36\% \)

**Reference impedance planes**

- Virtual drain plane
- Real drain plane
- Pre-match plane
- Load plane

**Simulation and experimental results**

- **Load impedance**
- **Performance vs input power**
- **Performance vs frequency**

**CONCLUSIONS**

A high-power high-efficiency Class-F amplifier employing GaN technology has been designed and built. Harmonic control is used to satisfy load conditions for Class-F operation. Experimental results have been obtained for a 40W PA prototype at 1.64GHz with up to 75% drain efficiency (after trimming) over a 280MHz bandwidth.