In this paper we present the design and measurements of a two-stage 75-GHz InP Double Heterojunction Bipolar Transistor (DHBT) power amplifier (PA). An optimized two-stacked transistor power cell has been designed, which represents the building block in the power stage as well as in the driver stage of the power amplifier. Besides the series voltage addition of the stacked structure, parallel power combining techniques were adopted to increase the output power of the MMIC amplifier, with four-way and eight-way corporate power combiners at the driver and power stages, respectively. At 75 GHz, the power amplifier exhibits a small signal gain of \( G = 12.6 \text{ dB} \), output power at 1-dB compression of \( P_{\text{out, 1dB}} = 18.6 \text{ dBm} \) and a saturated output power of \( P_{\text{sat}} > 21.4 \text{ dBm} \).