Power amplifiers (PA) are typically the most power hungry building blocks in RF transmitters. Achieving high output power and high efficiency is challenging at 60GHz due to the low gain and low breakdown voltage of the CMOS transistors and the loss of on-chip passive components. Thanks to the phased-array architecture that can increase the transmitter’s effective isotropic radiated power (EIRP) through spatial power combining, the output power of an individual power amplifier is less critical.

This chapter presents the design of a 60GHz active phase shifter integrated with a PA in a 65nm CMOS technology for phased array transmitters [61]. The one-path transmitter can be extended to multiple antenna paths.

This chapter is organized as follows. The design of a 60GHz active phase shifter for a transmitter is presented in Sect. 7.1. Section 7.2 discusses the design of a 60GHz power amplifier. The measurement results of the transmitter path are presented and discussed in Sect. 7.3.
7.1 Design of an Active RF Phase Shifter

The phase shifter in the transmitter has a high linearity requirement, so that it is the output stage of the power amplifier rather than the phase shifter that saturates first, otherwise the overall efficiency of the transmitter would be decreased.