

## 0.13- $\mu\text{m}$ Complementary Metal-Oxide Semiconductor Vector Modulator for Beamforming System

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**Abstract :** This paper presents a 0.13- $\mu\text{m}$  Complementary Metal-Oxide Semiconductor (CMOS) vector modulator for beamforming system. The vector modulator features a 360 $^\circ$  phase and gain range of -10 dB to 10 dB with a root mean square phase and amplitude error of only 2.2 $^\circ$  and 0.45 dB, respectively. These features make it a suitable for wireless backhaul system in the 5 GHz industrial, scientific, and medical (ISM) bands. It draws a current of 20.4 mA from a 1.2 V supply. The total chip size is 1.87x1.34 mm<sup>2</sup>.

**Keywords :** CMOS, vector modulator, beamforming, 802.11ac

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