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High Frequency Memristor-Based BFSK and 8QAM Demodulators

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Abstract : This paper presents the developed memristor based demodulators for eight circular Quadrature Amplitude Modulation (QAM) and Binary Frequency Shift Keying (BFSK) operating at relatively high frequency. In our implementations, the experimental-based 'nonlinear' dopant drift model is adopted along with the proposed circuits providing incorporation of all known non-idealities of practically realized memristor and gaining high operation frequency. The suggested designs leverage the distinctive characteristics of the memristor device, definitely, its changeable average memristance versus the frequency, phase and amplitude of the periodic excitation input. The proposed demodulators feature small integration area, low power consumption, and easy implementation. Moreover, the proposed QAM demodulator precludes the requirement for the carrier recovery circuits. In doing so, the designs were validated by transient simulations using the nonlinear dopant drift memristor model. The simulations results show high agreement with the theory presented.

Keywords : BFSK, demodulator, high frequency memristor applications, memristor based analog circuits, nonlinear dopant drift model, QAM
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