

A Variable Bandwidth Memristor-Based Legendre Optimum Low-Pass Filter for Radio Frequency (RF) Applications

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Abstract

This paper presents the enhancement of Legendre Optimum low pass filters in terms of reusability and bandwidth, based on the variable or programmable memristance of memristors. Two low pass filters, of third and fifth order, operating in the radio frequency range, and designed using the insertion loss method are presented. At 600 KHz and at 110 MHz, two MS memristor models, of the non-linear ion drift class is incorporated into the filter circuits in turn and their memristances varied such that $R_{off} - R_{on}$ decreases monotonically and $R_{off} - R_{on} > 0$. Results show a bandwidth enhancement of up to 100 KHz at 600 KHz, and up to 19MHz at 110MHz. This study also examines the effect of the simultaneous versus asynchronous variation of the memristance of the pair of memristors introduced into the filter circuits, as well as increase in filter order.

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