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Low Power, Low Noise Circuit for Biological Signal Recording

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ABSTRACT

Implantable devices are ideal for recording biological signals in animal models as they have minimal effect on the animal's normal behavior during observation. The creation of the circuitry for an implantable device has several restrictions including size, power consumption, and noise reduction. These factors compete against each other, making it necessary to carefully optimize circuit components for a given application. This study evaluates the design of a four-channel analog front end circuit board to record cardiac, neural, and respiratory biological signals. Through a critical analysis of component specifications for the circuit's components and an evaluation of the circuits' power and noise performance, the ideal analog front end for the implantable biological recording device was designed. The combination using components AD8235 and OPA2348 decreased noise, power consumption, and size by 43%, 58%, and 57% respectively without significantly impacting other metrics. This combination was chosen to best improve the performance of the implantable device.

KEYWORDS

Low amplitude, low power, low noise, implantable, biomedical