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(54) **SUPPORTING CIRCUITS WITH A SINGLE  
LOCAL OSCILLATOR**

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(57) **ABSTRACT**

A digital signal processing circuit includes an analog gain compensator that compensates for an analog gain of a baseband signal including a plurality of component carriers (CCs) to output a compensated baseband signal; an analog-to-digital converter (ADC) that converts the compensated baseband signal into a first digital signal; a plurality of filtering circuits that generate a second digital signal from the first digital signal; and a control circuit. Each filtering circuit sequentially filters the first digital signal so that a corresponding one of the second digital signals retains one CC among the CCs, compensates for a digital gain, and performs down-sampling. The control circuit generates an analog gain control signal for controlling the analog gain based on the second digital signals and a digital gain control signal for controlling the digital gain.

