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(54) **CONTROL CIRCUIT FOR A MULTIPHASE BUCK CONVERTER, RELATED INTEGRATED CIRCUIT, MULTIPHASE BUCK CONVERTER AND METHOD OF OPERATING A MULTIPHASE BUCK CONVERTER**

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(57) **ABSTRACT**

A control circuit for a multiphase buck converter includes a regulator circuit and a plurality of phase control circuits. The regulator circuit generates a regulation signal based on a feedback signal and a reference signal, and each phase control circuit receives a current sense signal and generates a respective PWM signal based on the respective current sense signal and the regulation signal. The control circuit includes a first selector circuit and a second selector circuit configured to receive a selection signal and selectively connect each phase control circuit of a subset of the phase control circuits to a PWM signal for driving a respective stage of the multiphase buck converter, and to a current sense signal provided by the respective stage of the multiphase buck converter. A selection control circuit generates the selection signal in order to connect the phase control circuits to different stages of the multiphase buck converter.