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A Stable Mode-Transition Technique for a Digitally Controlled Non-Inverting Buck-Boost DC-DC Converter

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This paper presents a stable mode-transition technique for a digitally controlled non-inverting buck-boost dc-dc converter, as shown in Fig. 1. The system is based on the li-ion battery which is suitable for portable devices as the power supply, and its output voltage varies from 2.7 V to 4.2 V. For variable nature of the battery output voltage, the system take the step-down converter structure for audio application, and take the step-up converter structure for back-light module application. Especially in radio frequency system, the power amplifier needs different voltage levels that depend on the signal power. In order to provide an adjustable voltage supply, the system chooses a four switches non-inverting buck-boost converter structure, and takes the separated-mode control scheme to get higher power efficiency. We also proposed a special technique to prevent the converter system from getting into an unstable output status that caused by the dead-zone between step-down and step-up mode. By using this technique, the converter system will maintain the output voltage slightly higher than what application needs, and also ensure the stability of the converter in any situation.

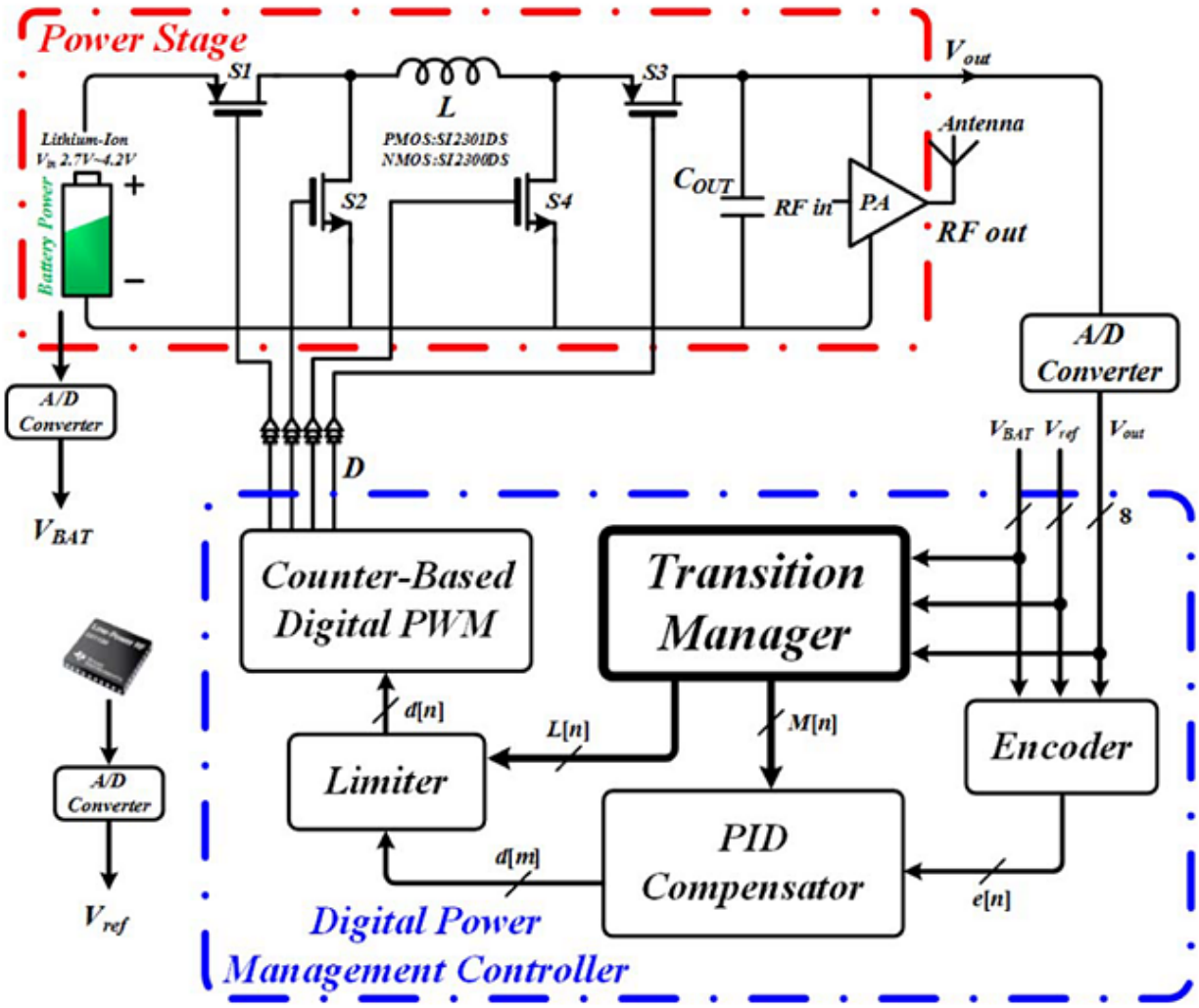

Fig. 1. Architecture of the digitally controlled non-inverting buck-boost dc-dc converter.