ISSUE: November 2020

80-V DC-DC Controllers Provide Extra Voltage Margin For Data Center, Telecom Applications

Renesas Electronics has announced a pair of innovative 80-V dc-dc controllers that support the extra voltage margin needed for data center servers, 48-V telecom and rugged industrial equipment (Fig. 1). The ISL81801 bidirectional buck-boost and ISL81802 dual buck controllers, which feature the company's proprietary modulation scheme and algorithms, are said to achieve the industry's highest reliability performance, react quickly to transient loads with a minimum number of BOM components, and provide the extra voltage margin that 48-V telecom, data center, and industrial applications demand.

The ISL81801 buck-boost controller acts like a "UPS on a chip" by enabling bidirectional current flow (forward or reverse) using constant-voltage and constant-current regulation. This allows a battery or supercapacitor to be charged and discharged using a single controller and power path.

According to the company, the ISL81801's combination of the industry's highest 80-V buck-boost switching frequency (600 kHz) and smallest package (5 mm x 5 mm) lets designers create ultra-compact, high-density power solutions. Its wide 4.5-V to 80-V range is well suited for many common applications, including 48-V motor drives, telecom, industrial battery backup systems, and solar power (Fig. 2).

The ISL81802 is a single-chip, 80-V dual-phase synchronous buck controller with integrated drivers. It is said to be the industry's only 80-V buck controller capable of 1-MHz switching frequency, enabling the use of small power supply inductors to improve power density. For higher power applications, multiple ISL81802s can be paralleled and interleaved with best-in-class transient response.

The ISL81802 can generate either two independent outputs, or a single high-current output, allowing creative power supply engineers tremendous flexibility and IP reuse across platforms. Additionally, the capability to supply either a constant output voltage or a constant current opens up a wide array of end-user applications, ranging from LED drive to powering blowers to maximize airflow in dense data center systems (Fig. 3).

"The new 80-V ISL81801 joins the popular 60-V ISL81601 and 40-V ISL81401 bidirectional buck-boost controllers that team with our industry-leading MCUs, power and analog portfolio, offering customers a family of choices for optimizing battery health and power use," said Philip Chesley, vice president of the Industrial and Communications Business Division at Renesas. "Leveraging Renesas' proprietary modulation scheme and algorithms allows the highly integrated ISL81801 and ISL81802 to achieve the highest reliability performance, and the ability to react quickly to transient loads with a minimum number of BOM components."

Key features of the ISL81801 buck-boost dc-dc controller include

- Wide input voltage range of 4.5 V to 80 V
- Wide output voltage range of 0.8 V to 80 V
- Programmable frequency from 100 kHz to 600 kHz with interleaved current sharing
- Sense both positive and negative inductor peak current
- Extensive multilayer protection for overvoltage, overtemperature, average and peak current limit on both outputs, undervoltage lockout, soft start, and shoot-through protection for MOSFET drivers.

Key features of the ISL81802 dual-phase buck dc-dc controller include

- Wide input voltage range of 4.5 V to 80 V
- Wide output voltage range of 0.8 V to 76 V
- Programmable frequency from 100 kHz to 1 MHz
- Each output features independent soft start and precision output-enable controls
- Extensive multilayer protection for overvoltage, undervoltage lockout, overtemperature, average and peak current limit on both outputs, and shoot-through protection for MOSFET drivers.

Mass production quantities of the ISL81801 and ISL81802 are available now from Renesas' worldwide distributors. They are supplied in 5-mm x 5-mm, 32-lead QFN packages and 38-lead, 4.4-mm x 9.7-mm HTSSOP packages. For more information, visit the ISL81801 product page and the ISL81802 product page.

Fig. 1. The ISL81801 bidirectional buck-boost and ISL81802 dual buck controllers are said to achieve the industry's highest reliability performance, react quickly to transient loads with a minimum number of BOM components, and provide the extra voltage margin that 48-V telecom, data center, and industrial applications demand. Acting as a "UPS on a chip", the ISL81801 enables bidirectional current flow using constant-voltage and constant-current regulation, allowing a battery or supercapacitor to be charged and discharged using a single controller and power path. The dual-phase ISL81802 synchronous buck controller with integrated drivers is described as the industry's only 80-V buck controller capable of 1-MHz switching frequency.

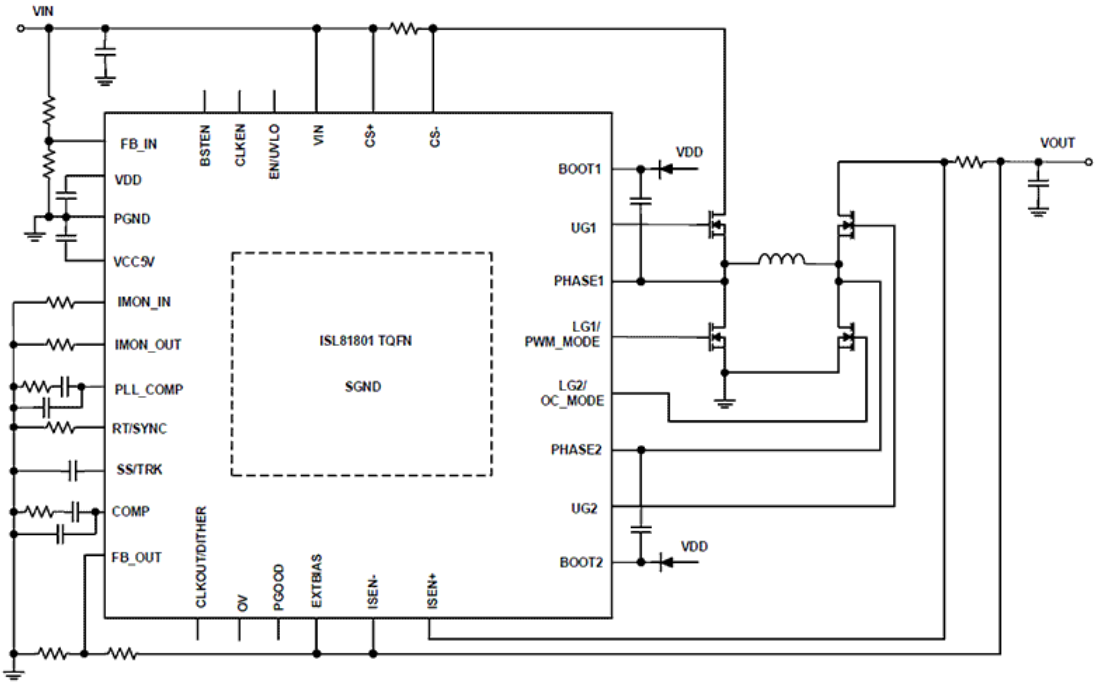

Fig 2. The ISL81801 is a true bidirectional four-switch synchronous buck-boost controller with peak and average current sensing and monitoring at both ends. With wide input and output voltage ranges, the controller is suitable for industrial, telecommunication and other industrial applications. This IC uses a proprietary buck-boost control algorithm with valley current modulation for boost mode and peak current modulation for buck mode control.

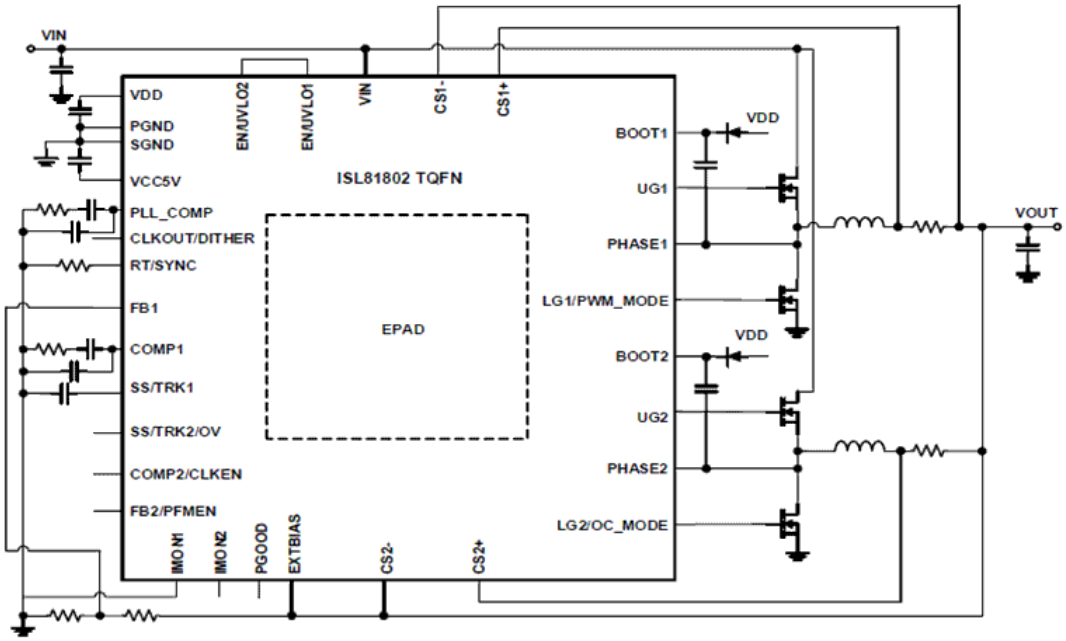

Fig. 3. The ISL81802 is a dual synchronous buck controller that generates two independent outputs or one output with two interleaved phases for a wide variety of applications in industrial and general purpose segments. With a wide input and output voltage ranges, the controller is suitable for telecommunication, data center and computing applications. The ISL81802 uses peak current mode control with phase interleaving for the two outputs.