RGDCDC

PRODUCT BRIEF

Ridgetop Group Inc

ENGINEERING INNOVATION

Ultra-High Efficiency DC-DC Switching Converter Circuit

InstaCell™ Semiconductor IP

Industry Standard, High Performance Technology

- Wide range of DC input levels supported: 1.5 to 15 V
- User-selectable regulated output voltage range of 2 to 6 V
- Advanced, reconfigurable, 99% efficiency low-power supply
- For use in many portable applications requiring long battery life
- Field-programmable inductorless DC/DC design
- Initial design for XFAB XC06 0.6 µm – available in other processes
- Switched-capacitor converter serves applications below 200 mA of current

General Description

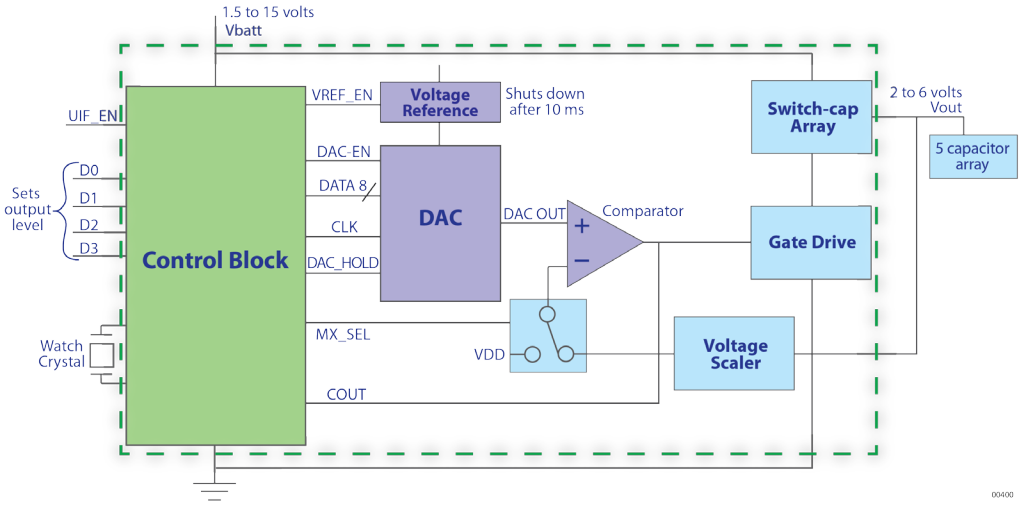

Figure 1: Converter block diagram – IP block within dotted line; separate blocks (purple) also available as stand-alone IP

The Ridgetop DC-DC switching converter/power supply design meets demanding requirements for size, efficiency, and voltage range, and greatly exceeds the performance of similar commercial products.

Combined with modern CMOS processing technology, ultra-small form factors can now be achieved, while maintaining high efficiency by use of small-area switching transistors. Built-in battery monitoring features allow the equipment in which it is deployed to determine the strength of the battery and predict when wear-out might occur. Using an on-chip digital-to-analog converter (DAC), we can take in a digital word and compare this voltage with the output voltage. Then we can modulate the output pass transistor that is used to set the output voltage. In this way, we can derive virtually any output voltage within the output range.

Preliminary Specifications

SPECIFICATION	RIDGETOP DESIGN
Input voltage range	1.5 to 15 V
Output voltage	2 to 6 V range
Output current	10 mA
Output voltage ripple	<30 mV with 1 F cap
Efficiency	99%, subject to input conditions
Selection method	Digitally selectable
Field-configurable?	Yes
Single-package solution?	Yes
Monitor features	6-bit digital battery voltage monitor

The inputs/outputs (I/Os) come from the control block (shown in Figure 1), which is the main control for the whole converter. The voltage reference block generates a stable known reference that is used by the DAC. It is only needed for a short time when a conversion is being made, therefore its power drain is not critical. The DAC is used to set the comparator input voltage that controls the output voltage.

The supply voltage control or buck/boost block is made up of transistor switches and capacitors that allow the battery input voltage to be multiplied up or divided down without any inductive elements. The supply voltage control block converts the input voltage to the desired output voltage by boosting the input voltage when it is lower than the desired output voltage, or by bucking it when it is higher than the desired output voltage. Figure 2 shows a typical multichip carrier module (MCM) application.

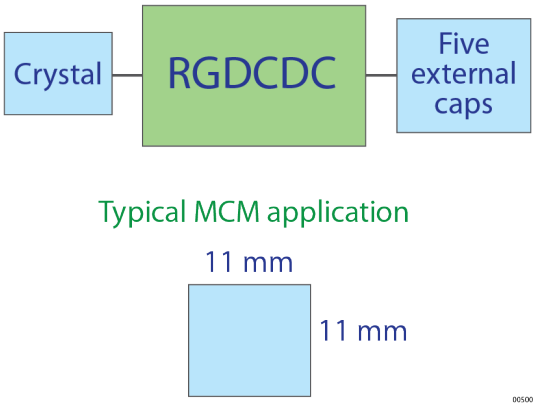

Figure 2: Footprint is 11 x 11 mm when used in multichip carrier module (MCM)

Applications

- Cell phones
- Telecommunications
- Portable field equipment
- Health care equipment
- Structural health monitoring
- Unmanned aerial vehicles (UAVs)
- Energy harvesting technologies

InstaCell IP blocks available:

- Bandgap reference (BGR)
- Digital-to-analog converter (DAC)
- Comparator

Need modified or custom design? Contact Ridgetop at +1 520-742-3300 to discuss your ideal solution!

Corporate Headquarters

3580 West Ina Road

Tucson, Arizona 85741 USA

OFFICE +1 520 742 3300

INFO@RIDGETOPGROUP.COM

Worldwide Locations

Ridgetop Group Inc. has support and sales locations in Germany, Belgium, Japan, China, and the United States.

For office locations and contact information, please call the corporate headquarters or visit us on the web: **www.ridgetopgroup.com**