60 V Input / Synchronous Buck DC/DC Converter Controller

Campbell, CA, September 7, 2021 - Ricoh Electronic Devices Co., Ltd. in Japan has launched the synchronous buck DC/DC converter controller R1260 with a wide input voltage range up to 60 V and absolute maximum rating of 80 V. An adjustable output voltage range can be specified from 1.0 to 16 V and the output current is based on your requirements, depending on the selected external N-channel MOSFETs. The product offers maximum design flexibility since various settings can be tailored to the specifications of the application. The R1260 is an efficient single chip solution and is used to generate power to low voltage applications but is sourced from a wide primary supply voltage. An array of protection circuits are embedded to intervene in critical failure events and prevents further damage to other delicate electronic circuits. It is targeted for consumer, industrial and automotive applications and is added to our Product Longevity Program for long term availability.

When a system designer specifies a non-isolated DC/DC converter for a new circuit, considering the needed input voltage range is just as important as considering the required performance characteristics and features. This new product is a superior and flexible solution which meets these requirements with ease. Today's popular power sources for automotive or industrial applications range from 12, 24 or 48 V or higher, the R1260 is able to handle up to 60 V input voltage and has an absolute maximum rating of 80 V. The adjustable output voltage can be set from 1 to 16 V but is stepwise available in three individual voltage ranges, depending on the product version. Additional high and low-side N-Channel MOSFETs are required complementary to the DC/DC Converter Controller.

A unique current mode PWM architecture is used and the R1260 proves to be a very stable DC/DC converter with high efficiency (95%).

Three different operating modes are available, controlled by the mode pin:

1. Automatic PWM/VFM mode, to maintain high efficiency under light and heavy load conditions, the device automatically switches between PWM and VFM mode.
2. Forced PWM mode, reduces noise since the frequency is fixed during all load conditions.
3. PLL_PWM mode, makes it possible to synchronize the frequency to an external clock, which has the advantage to minimize noise issues when multiple DC/DC Converters are used in the same system.

Phase compensation can be made through an external resistor and capacitor in order to make optimisations for the inductor, output capacitor and operating conditions.

A variety of protection circuits are available, which contributes to the safe operation of the application. When the device is not ready and any of the protection circuits or states below are active, the Power-Good pin (PGOOD) will provide a fault signal to the system:

- CE pin disabled (when the chip is disabled)
- UVLO (undervoltage lock-out, input voltage below minimum value)
- Thermal Shutdown (junction temperature exceeds 160°C)
- During Soft Start Time (slow ramp up of the output voltage)
- UVD or OVD (under and overvoltage detection, output voltage deviates over ±10%)
- Hiccup- or Latch-type overcurrent protection

The designer has an option to select between a Hiccup-mode or Latch-mode overcurrent protection, depending on preference. Hiccup-mode overcurrent protection turns off the chip after detecting an overcurrent condition and tries to resume to normal operation after a delay time. The overcurrent state in Latch-mode does not automatically return to normal operation, but requires a restart of the chip after removing the overcurrent condition.

An EMI reduction can be achieved by using the optional Spread-Spectrum Clock Generator (SSCG) for a diffuse oscillation frequency at PWM operation. If the oscillator frequency of the DC/DC converter is modulated slightly via SSCG (-7.2% linearly and back to the original frequency during 128 clock cycles), the EMI energy is spread rather than concentrated at one frequency resulting in a lower EMI emission from the DC/DC converter.

The R1260 is available in an HSOP-18 package, evaluation boards are now available from our approved local distributors and online partners. We distinguish three different versions for consumer, industrial and automotive purposes. (AEC-Q100 compliant soon).

Features R1260 (Consumer grade):

Input Voltage Range / Max. rating:	5 to 60 V / 80 V
Output Voltage Range:	1.0 to 3.15 V / 3.15 to 8 V / 8 to 16 V
Feedback Voltage:	0.8 V ±1.5%
Consumption Current at No Load:	Typ.15µA (at VFM mode)
Oscillator Frequency:	150kHz to 600kHz
Adjustable Soft-start with an external capacitor:	600µs (without external capacitor)
Minimum ON Time:	Typ. 130 ns
Minimum OFF Time:	Typ.120 ns

Selectable Output Voltage Controls: PWM/VFM Auto-switching mode / Forced PWM / PLL_PWM mode

Operating Temperature Range (Consumer / Industrial & Automotive grade): -40 to 105°C / -40 to 125°C

Spread Spectrum Clock Generator (SSCG) Optional

Power Good Output

Undervoltage Detection (UVD), Overvoltage Detection (OVD)

Undervoltage Lockout (UVLO)

Thermal Shutdown:	T_j = 160°C (Typ.)
Overcurrent Protection:	Hiccup-type, Latch-type
Short-circuit Protection:	LX to V_{IN} or GND
Package R1260S:	(L5.2 x W6.2 x H1.45 mm) HSOP-18
Datasheet:	https://www.n-redc.co.jp/en/products/dc-dc-switching-regulator/spec/?product=r1260
YouTube:	https://youtu.be/p19zboHkCGU

About Ricoh Electronic Devices Co., Ltd

Ricoh Electronic Devices Co., Ltd is a leading global provider of semiconductor products, offering a comprehensive portfolio of CMOS Power Management and Real Time Clock ICs that enable engineers to design advanced applications for the consumer, industrial and automotive markets. The companies headquarter is based in Japan, as well as development, sales and manufacturing facilities. Regional sales and support offices are located in North America, Europe, and Asia.

Ricoh has an extensive expertise in small package technology and has a focus on developing products providing features such as low-supply current, high-accuracy, high efficiency and high-reliability.

For further information, please visit https://www.n-redc.co.jp/en/

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With cultivated knowledge and organizational capabilities nurtured over its 85-years history, Ricoh is a leading provider of document management solutions, IT services, communications services, commercial and industrial printing, digital cameras, and industrial systems.

Headquartered in Tokyo, Ricoh Group has major operations throughout the world and its products and services now reach customers in approximately 200 countries and regions. In the financial year ended March 2021, Ricoh Group had worldwide sales of 1,682 billion yen (approx. 15.1 billion USD).

For further information, please visit www.ricoh.com.

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