

# Low power Boost DC/DC Converter for Energy Harvesting

**Campbell, CA, June 21, 2021** - Ricoh Electronic Devices Co., Ltd. in Japan has launched the R1810 Boost DC/DC Converter, a complete energy harvesting solution designed for powering low current consuming IoT devices by extracting energy from Photovoltaic cells. Target applications include wireless sensors, home and building automation, remote monitoring, presence detection, industrial equipment controls and more

Alternative power supplies replacing conventional batteries are nowadays immensely popular, autonomous operating wireless devices significantly reduce the cost and labour of regular maintenance to replace batteries. Such power supplies operate with photovoltaic cells that usually supply a voltage which is way below the desired operating voltage for the application, therefore a special circuit is required that collects, converts and stores energy in an external energy storage capacitor, followed by regulation of the output voltage to the required level.

The R1810 is especially tailored for this purpose and starts up with only 9 $\mu$ W provided from a single cell photovoltaic element, the start-up voltage is only 0.5 V and once started, the operation continues even if the input voltage drops below 0.2 V. It has a high efficiency performance of 66% at 5  $\mu$ A output current ( $V_{in}=0.5V$ ,  $V_{set}=2.6V$ ). The advanced R1810 has an internally fixed maximum power point voltage ( $V_{MP}$ ) and output voltage setting ( $V_{SET}$ ) to optimize the performance of the electrical circuit with respect to the selected energy harvester type. Once sufficient energy available on the input and increases above the  $V_{MP}$  level, the boost DC/DC Converter will be enabled to transfer energy from input to the output. When the amount of transferred power exceeds the supplied power from the photovoltaic cell, the input voltage decreases below  $V_{MP}$  and the DC/DC converter stops switching.

Two monitoring circuits indicate the status of the conversion process on the respective outputs, the Input Power Good function becomes active when the output voltage level falls below the  $V_{OUTUVLO}$  voltage and whether the DC/DC converter stops switching for at least 1.5 seconds. Another Output Power Good function indicates that the output voltage level drops below 50 to 80% of its nominal level, this threshold is internally set and specified by the product version.

A built-in reverse current protection is enabled to prevent a current flow from output to input when light on the photovoltaic cell is blocked. As soon the input voltage drops below the output voltage, the high side MOSFET transistor is turned off to avoid a reverse current draining the energy storage capacitor.

The R1810 is available in a regular DFN2735-14 or a tiny WLCSP-15-P1 package.

## Features R1810:

Start-up voltage:	Typ. 0.35 V, Max. 0.50 V ( $0 \leq T_a \leq 65^\circ\text{C}$ ), Max. 0.55 V ( $-40 \leq T_a \leq 85^\circ\text{C}$ )
Input Voltage Range:	0.2 to 2.1 V ( $V_{SET} = 2.5$ V)
Output Voltage Range:	2.3 to 4.5 V
Output Voltage Accuracy:	$\pm 5.0\%$
Low current consumption:	Typ. 600 nA ( $T_a = 25^\circ\text{C}$ , at no load)
Start-up power:	9 $\mu$ W ( $V_{MPSET} = 0.5$ V / $V_{SET} = 2.6$ V)
Maximum Power Point Voltage Setting:	from 0.2 to 2.1 V, in 50 mV increments
Input Power Good Function	
Output Power Good Function	
Efficiency:	( $V_{IN} = 0.5$ V, $V_{SET} (V_{OUT}) = 2.6$ V) 66% at 5 $\mu$ A

Package R1810L: (3.5 x 2.7 x 0.6 mm) DFN2735-14

Package R1810Z: (2.88 x 1.68 x 0.36 mm) WLCSP-15-P1

Datasheet: <https://www.n-redc.co.jp/en/pdf/datasheet/r1810-ea.pdf>

YouTube: [https://youtu.be/blujG57r\\_1s](https://youtu.be/blujG57r_1s)

### **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/> or contact:

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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).

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