

## ROHM's New 80V Withstand 5A Output Power Supply ICs

June 30<sup>th</sup>, 2021

*Contributing to improved reliability and functionality in industrial equipment including factory automation and 5G base stations*



ROHM announces the buck DC/DC converter ICs with built-in MOSFET, BD9G500EFJ-LA and BD9F500QUZ, that support high voltages and currents in factory automation equipment such as PLCs/inverters, and 5G base stations that handle high power.

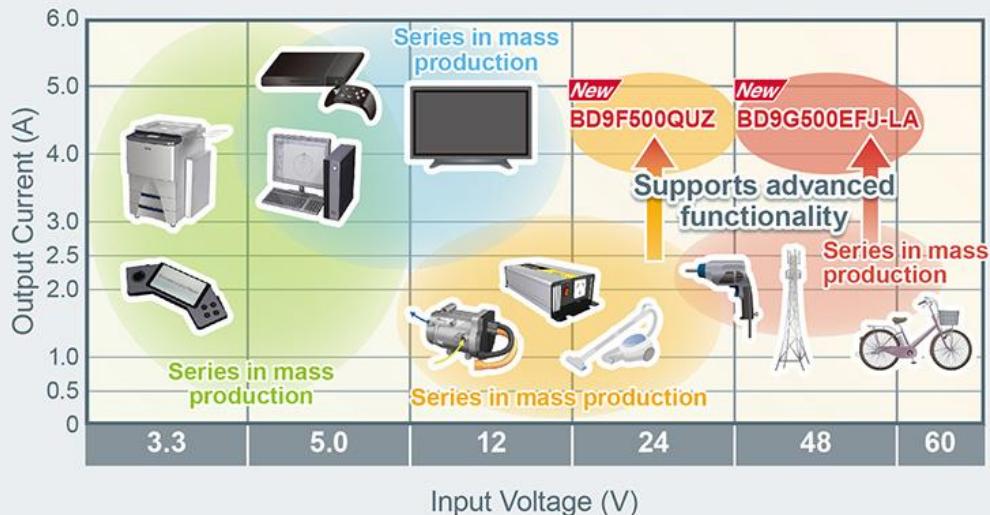
Recent years have seen evolving markets of battery-driven applications and advanced industrial equipment such as 5G base stations and factory automation systems equipped with new functions utilizing AI and IoT. This demands power supply ICs that are not only compact and operate at high efficiency, but also deliver large currents for operating multiple functions and can withstand high voltages to prevent damage from sudden surges (i.e. due to lighting).

ROHM, which leverages a vertically integrated production system along with advanced power processes to develop power supply ICs for the industrial market where reliability and long-term supply are just as important as product characteristics, has recently developed DC/DC converter ICs that support higher voltages and currents.

The BD9G500EFJ-LA and BD9F500QUZ are non-isolated DC/DC converter ICs developed by utilizing proprietary analog design technology based on high voltage BiCDMOS power processes to provide the power supply functionality required by increasingly sophisticated industrial equipment.

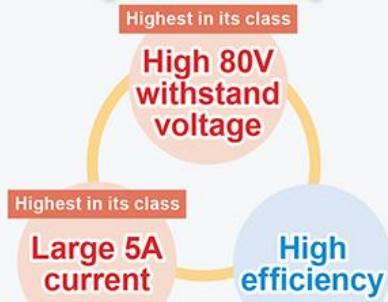
In addition to a best-in-class 80V withstand voltage for 48V power supply systems, the BD9G500EFJ-LA with built-in MOSFET delivers the largest output current in its class (5A), contributing to higher reliability and functionality in charging and 5G base stations that handle large power. At the same time, the BD9F500QUZ with built-in Nano Pulse Control™ technology achieving a high step-down ratio provides 39V withstand voltage and 5A output current in a compact, low-profile package (3.0×3.0×0.4mm). Moreover, the product features an over current protection as SEL1/SEL2 pins can be selected. These features are ideal for 24V power supply systems – enabling support for higher functionality and greater miniaturization in a wide range of advanced industrial equipment (i.e. factory automation).

## ROHM Buck DC/DC Converter Lineup and Applications



### DC/DC Converter IC [BD9G500EFJ-LA and BD9F500QUZ] Overview

For 48V Power Supply Systems  
(BD9G500EFJ-LA)



For 24V Power Supply Systems  
(BD9F500QUZ)



Contributes to higher reliability and increased functionality  
in a wide range of industrial equipment

## Key Features

The BD9G500EFJ-LA and BD9F500QUZ are non-isolated DC/DC converter ICs with a built-in MOSFET developed by leveraging proprietary analog design technology together with high voltage BiCDMOS power processes. The following features contribute to high reliability, high functionality, and greater miniaturization demanded by the latest industrial equipment.

### • BD9G500EFJ-LA [Ideal for 48V Power Supply Systems]

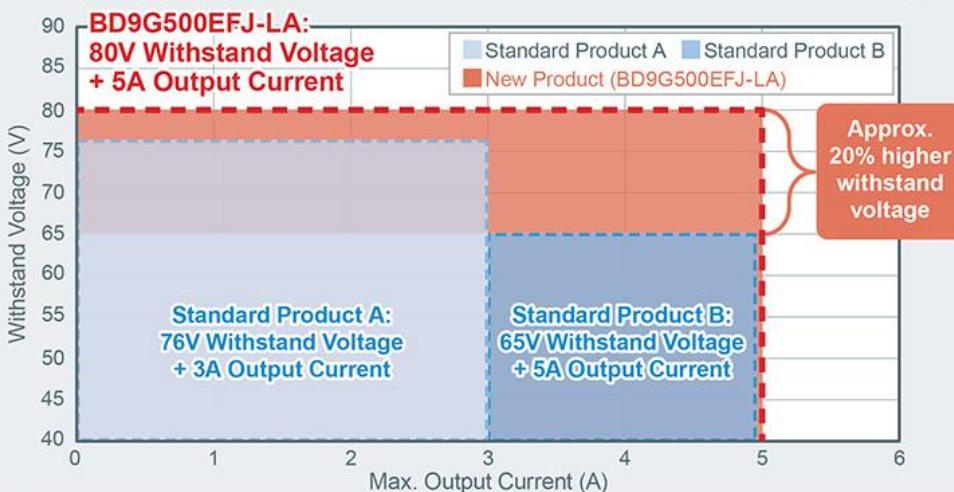
#### 1. Class-leading 80V withstand voltage ensures a wider safe operating range

The BD9G500EFJ-LA utilizes high voltage Bi-CDMOS processes to achieve best-in-class 80V withstand voltage in a non-isolated DC/DC converter IC with high-side MOSFET (asynchronous rectification type) along with a wide safe operating range. Compared to standard products with equivalent output current, this IC has succeeded in increasing withstand voltage by

approximately 20%, providing sufficient margin against sudden surge voltages not only for 48V primary power supplies for 5G base stations and servers, but for 60V systems as well used in electric bicycles and power tools which are seeing larger battery sizes, resulting in higher application reliability.

### High Withstand Voltage / Large Current For 48V Power Supply Systems (BD9G500EFJ-LA)

Comparison of Buck DC/DC Converter ICs with a Withstand Voltage 60V or Higher



**80V withstand voltage and 5A output current allow ROHM's IC to cover a wider range vs standard products**

#### 2. Superior 5A output current capability contributes to higher functionality and smaller size in advanced industrial equipment

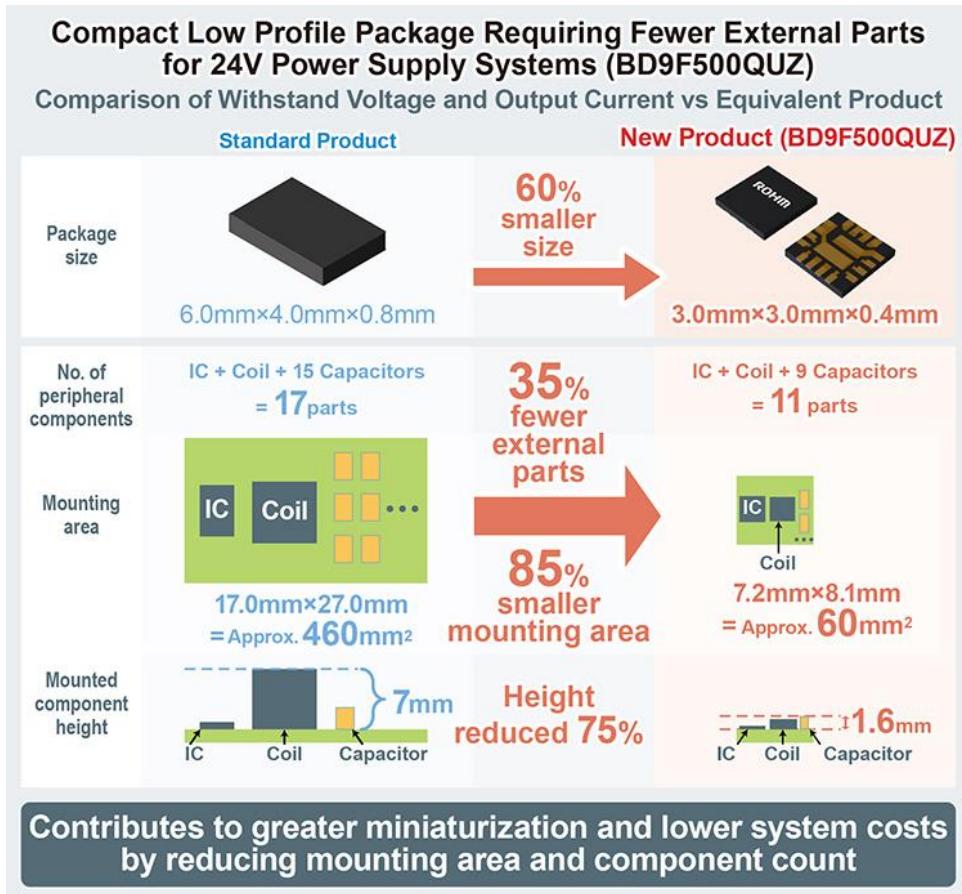
A high withstand voltage of 80V is achieved with a maximum output current of 5A - the highest in the industry among DC/DC converter ICs with a withstand voltage of 60V or more. This enables the miniaturization of equipment integrating multiple functions as well as industrial applications pursuing increased functionality by incorporating AI and/or IoT. At the same time, the built-in low-loss MOSFET achieves a high power conversion efficiency of 85% over a wide output current range from 2A to 5A (despite asynchronous rectification), which translates to greater power saving performance.

#### • BD9F500QUZ [Optimized for 24V Power Supply Systems]

##### 1. Achieves greater miniaturization and lower system costs by reducing mounting area and component count

The BD9F500QUZ non-isolated DC/DC converter IC with built-in MOSFET (synchronous rectification type) leverages analog design technology to achieve a breakdown voltage of 39V and 5A output in a compact package (3.0×3.0×0.4mm). Compared to standard products with equivalent performance (6.0×4.0×0.8mm), ROHM's IC reduces size by approx. 60% along with the number of peripheral components. In addition, a high 2.2MHz (max.) switching speed

enables stable operation even with a small 1.5uH coil, decreasing both mounting area and board height, which leads to smaller application size and component costs in 24V primary power supply systems for factory automation equipment such as PLCs and inverters.



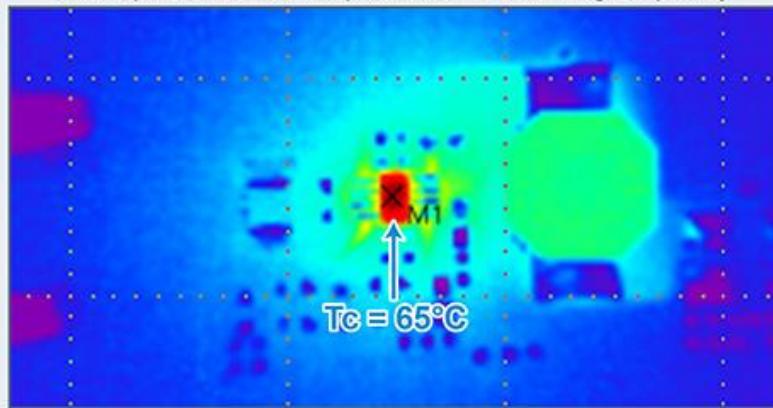
## 2. High efficiency and low heat generation improve reliability

## New Product Ensures Low Heat Generation (BD9F500QUZ)

### Heat generation evaluation on board

Measurement Conditions:

24V input, 3.3V/4.0A output, 600kHz switching frequency



Achieves low temperature operation: 65°C

Requires no heat generation countermeasures despite being compact

The BD9F500QUZ can operate with low heat generation despite its small size and fast switching capability. In contrast to compact products with equivalent functions that can reach temperatures of nearly 100°C, requiring heat generation countermeasures (i.e. heat dissipation through a heat sink or external MOSFET), ROHM's new product features high efficiency operation (90% max. at 3A output) and a high heat dissipation package that limits temperatures to around 65°C, eliminating the need for heat generation measures while contributing to higher application reliability.

### New DC/DC Converter IC Specifications

Part No.	Withstand Voltage [V] (Max.)	Input Voltage Range [V]	Output Voltage Range [V]	Max. Output Current [A] (Max.)	SW Frequency [MHz]	Operating Temp Range [°C]	Package [mm]
<small>NEW</small> BD9G500EFJ-LA	80	7 to 76	1 to 0.97xV <sub>IN</sub>	5	0.1 to 0.65	-40 to +125	HTSOP-J8 4.9 x 6.0 x 1.0
<small>NEW</small> BD9F500QUZ	39	4.5 to 36	0.6 to 14	5	0.6, 1.0, 2.2	-40 to +85	VMMP16LZ3030 3.0 x 3.0 x 0.4

### Application Examples

#### 48V power supply systems (BD9G500EFJ-LA)

- Servers, charging stations, and power amps for 5G base stations requiring 48V class power input
- Electric bicycles, power tools, and other applications requiring 48V/60V class power input
- Home appliances such as Vacuum cleaners, washing machines, and other applications with motors exposed to large surge voltages

#### 24V power supply systems (BD9F500QUZ)

- Surveillance cameras and factory automation equipment such as PLCs and inverters requiring 24V class power input
- Power supplies for low voltage control systems, including FPGAs and SoCs installed in various industrial equipment

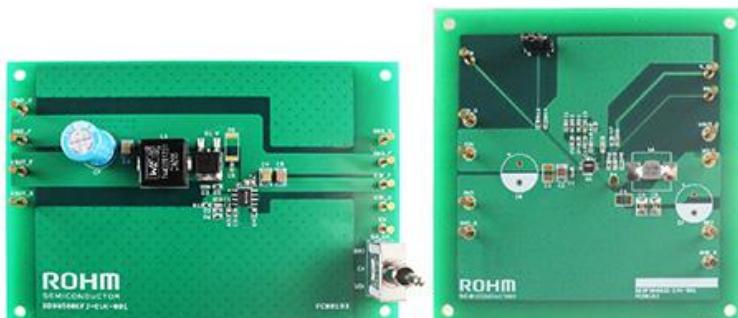
**Sales Launch Date:** May 2021

**Pricing:** \$3.0/unit (samples, excluding tax) **Online Distributors:** Digi-Key, Mouser, and Farnell  
(Scheduled to be released at other online distributors as well.)

#### Products

Part No.	Functions
BD9G500EFJ-LA	7V to 76V input/5A output 1ch buck DC/DC converter with built-in high-side MOSFET (asynchronous rectification type)
BD9F500QUZ	4.5V to 36V input/5A output 1ch buck DC/DC converter with built-in MOSFET (synchronous rectification type)
BD9G500EFJ-EVK-001	BD9G500EFJ-LA evaluation board
BD9F500QUZ-EVK-001	BD9F500QUZ evaluation board

#### Evaluation Boards



## **Terminology**

### **DC/DC Converter**

A type of power supply IC that converts between 2 different DC voltage levels. In general, there is a step-up type (boost) for increasing the voltage and step-down (buck) that reduces voltage.

### **Isolated/Non-Isolated**

Isolated types include measures to prevent electric shock. Non-isolated types, which are installed after isolated types, typically feature greater miniaturization and higher efficiency.

### **Surge Voltage**

A sudden, large voltage generated externally to the IC, such as from motor startup or lightning.

### **Asynchronous/Synchronous Rectification**

Both are output control methods for DC/DC converters. Asynchronous rectification consists of one MOSFET (transistor) and one diode, while synchronous rectification is comprised of 2 MOSFETs.

Although synchronous rectification is more difficult to control than asynchronous, power conversion efficiency tends to be much better.