

ROHM's New 600V Super Junction MOSFETs: Delivering Class-Leading Low ON Resistance along with the Industry's Fastest Reverse Recovery Time for significantly lower power consumption in home appliances and industrial equipment

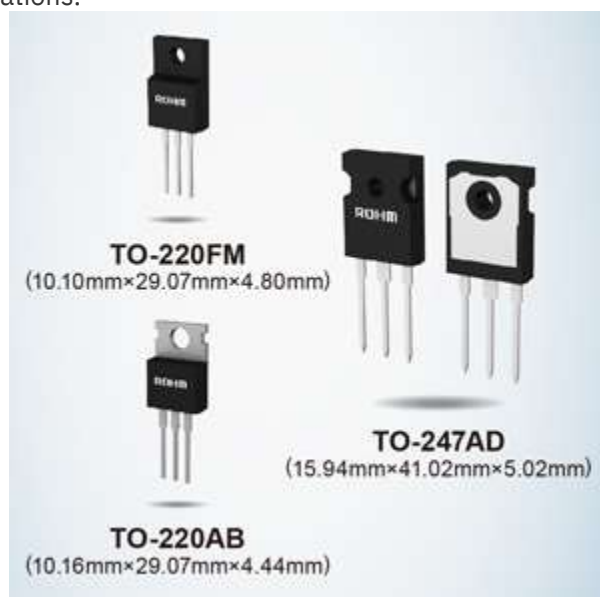
May 5th, 2022

ROHM has added seven new devices, the R60xxVNx series, to its PrestoMOS™ lineup of 600V [Super Junction MOSFETs](#) which stand out for their class-leading low ON resistance and the industry's fastest reverse recovery time (t_{rr}). The R60xxVNx series is optimized for power circuits in industrial equipment requiring high power, such as servers, EV charging, and base stations, as well as motor drives in white goods that are increasingly using inverters to meet the trend towards greater energy savings.

In recent years, as power consumption has increased worldwide along with the need for a more effective use of power, industrial equipment such as servers, EV/base stations, air conditioners, and other home appliances have become more energy efficient, demanding power semiconductors to further reduce power loss. In response, ROHM expanded its existing PrestoMOS™ lineup with new devices that contribute to even lower application power consumption by offering lower ON resistance than standard products.

The new R60xxVNx series adopts the latest proprietary processes to achieve the industry's fastest reverse recovery time while reducing ON resistance (which is in a trade-off relationship) by up to 20% compared to equivalent products.

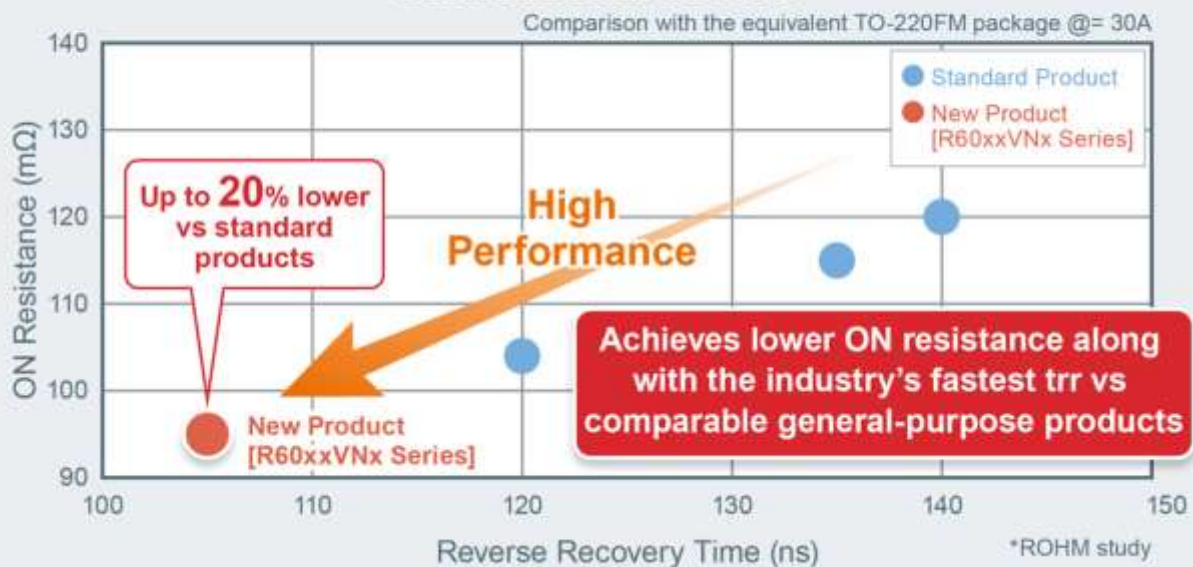
In terms of reverse recovery time, the new Super Junction MOSFETs inherit the breakthrough 105ns already provided by existing ROHM PrestoMOS™ products, making it possible to reduce switching loss by approximately 17% compared to other solutions. With these two features the new devices improve efficiency in various applications.



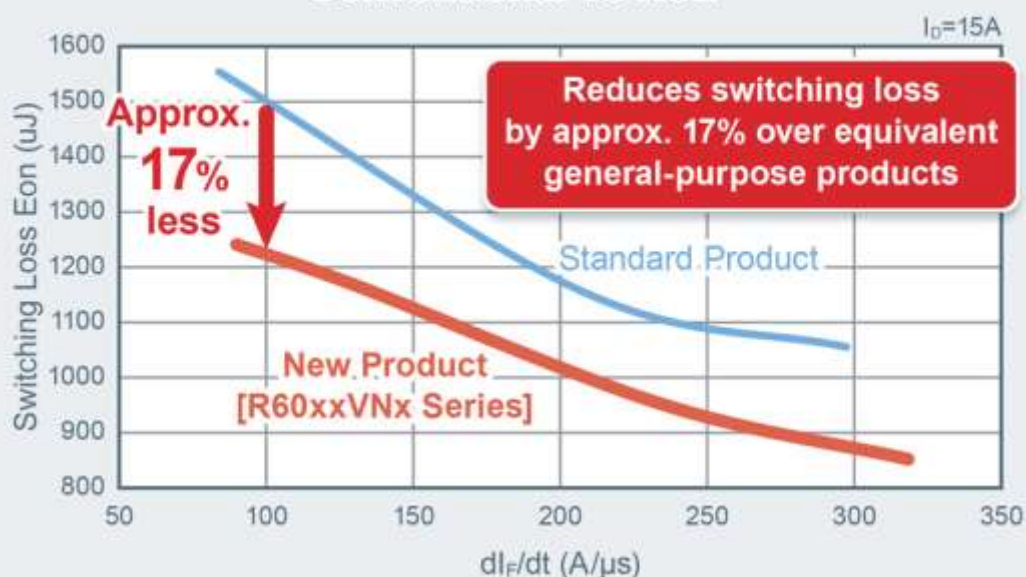
At the same time, two even lower ON resistance models have been added to the R60xxYNx series of standard low ON resistance 600V Super Junction MOSFETs. This enables users to select the ideal product based on application requirements.

Going forward, ROHM will continue to expand its lineup to include new Super Junction MOSFETs featuring even lower noise performance that contribute to solving social issues (i.e. preserving the environment) by reducing power consumption in a wider range of applications.

Comparison of ON Resistance and Reverse Recovery Time: Conventional vs New



Switching Loss Comparison: Conventional vs New

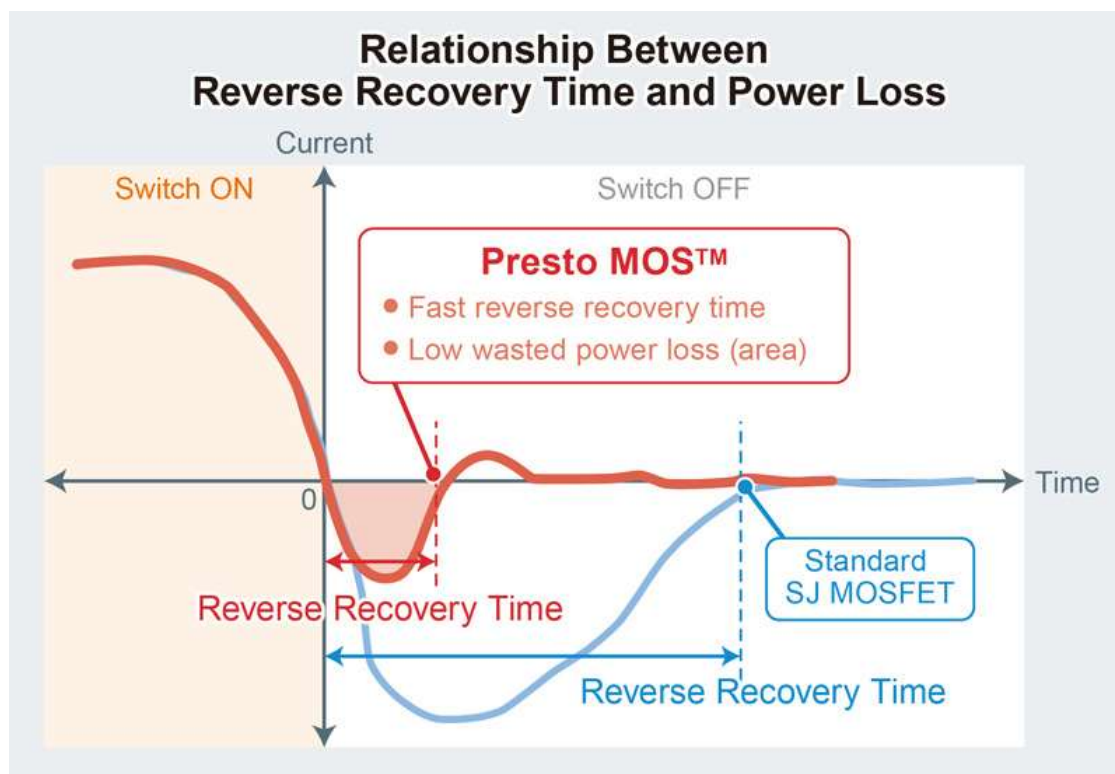


Key Features

1. Achieves class-leading low ON resistance and the industry's fastest reverse recovery time

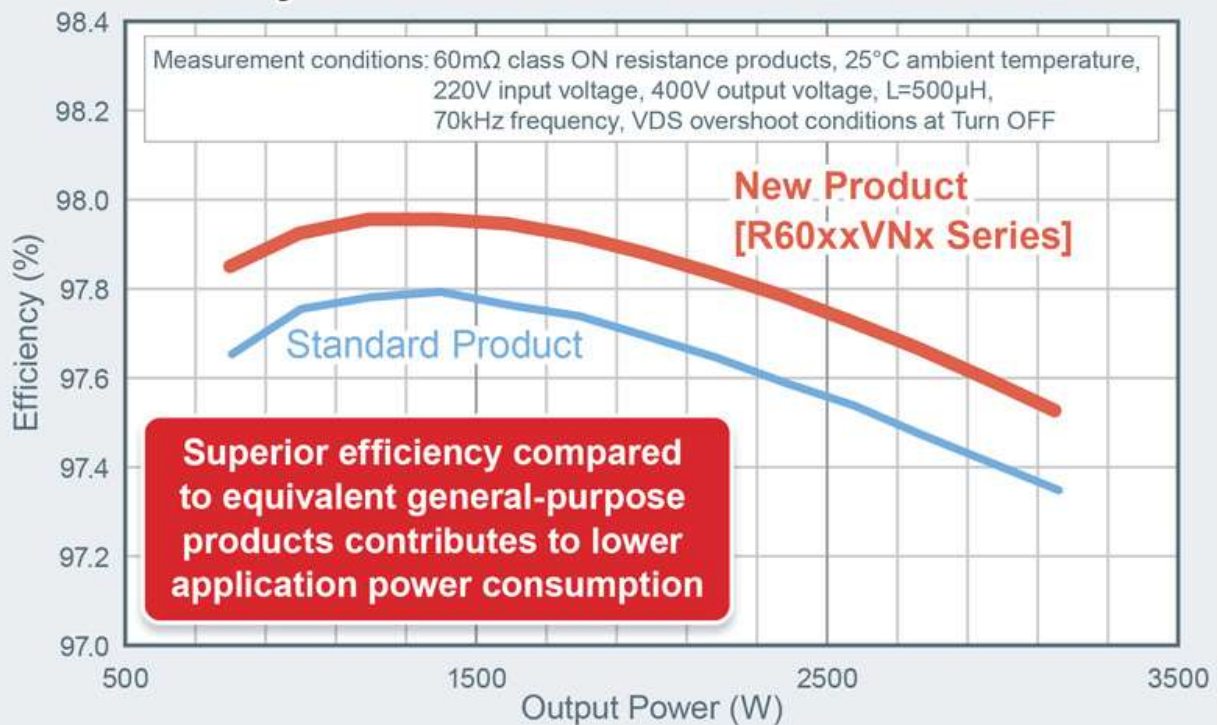
ROHM's R60xxVNx series of PrestoMOS™ 600V [Super Junction MOSFETs](#) utilizes the latest processes to reduce ON resistance per unit area. Despite the difficulty in reducing ON resistance given the trade-off relationship with reverse recovery time, up to 20% lower ON resistance has been achieved compared to equivalent standard products (TO-220FM package), contributing to even lower power consumption in various applications.

2. The industry's fastest reverse recovery time (t_{rr}) minimizes switching loss



Generally, when miniaturizing processes, basic performance such as ON resistance is improved while reverse recovery time deteriorates. In contrast, ROHM's R60xxVNx series utilizes a proprietary high-speed technology to achieve the industry's fastest recovery time of 105ns while maintaining lower ON resistance compared to equivalent TO-220FM package products. Eliminating wasted current reduces power loss during switching by approximately 17% over standard products. Furthermore, standard types such as the R60xxYNx series are offered that feature t_{rr} in the 300 to 400ns range at the same ON resistance.

Efficiency Comparison Using a Synchronous Rectification Boost Circuit









Thanks to these two features, the R60xxVNx series offers a higher efficiency than standard products, even when compared to evaluation boards using synchronous rectified boost circuits that pursue high efficiency (60mΩ class ON resistance products), contributing to significantly lower power consumption in applications such as solar power inverters and uninterruptible power supplies (UPS).

Product Lineup





R60xxVNx Series (PrestoMOS™)

R60xxYNx Series (Fast Switching Type Super Junction MOSFETs)

| Withstand Voltage V _{DS} [V] | ON Resistance R _{ON} typ. [mΩ] V _{GS} =12V | Reverse Recovery Time t _{rr} typ. [ns] | Package | | | | | |
|---|--|--|---|---|---|---|--|---|
| | | | TO-252 <DPAK> | (TO-220FM) <TO-220FP> | TO-220AB | TO-3PF | TO-247AD (TO-247) | MO-299 (TOLL) |
| | | |  |  |  |  |  |  |
| 600 | 324 | 200 to 600 | ☆ R6010YND3 | ☆ R6010YNX | ☆ R6010YNX3 | | | |
| | 215 | | ☆ R6014YND3 | R6014YNX | ☆ R6014YNX3 | | | |
| | 154 | | | R6020YNX | ☆ R6020YNX3 | | ☆ R6020YNZ4 | ☆ R6020YNJ2 |
| | 137 | | | ☆ R6022YNX | ☆ R6022YNX3 | | ☆ R6022YNZ4 | ☆ R6022YNJ2 |
| | 112 | | | ☆ R6027YNX | ☆ R6027YNX3 | | ☆ R6027YNZ4 | ☆ R6027YNJ2 |
| | 80 | | | ☆ R6038YNX | ☆ R6038YNX3 | | ☆ R6038YNZ4 | ☆ R6038YNJ2 |
| | 68 | | | ☆ R6049YNX | ☆ R6049YNX3 | | ☆ R6049YNZ4 | ☆ R6049YNJ2 |
| | 50 | | | ☆ R6061YNX | ☆ R6061YNX3 | | ☆ R6061YNZ4 | |
| | 49 | | | | | | | ☆ R6063YNJ2 |
| | 36 | | | | | ☆ R6086YNZ | ☆ R6086YNZ4 | |
| | 21 | | | | | | ☆ R60A4YNZ4 | |

☆: Under Development

Package indicates JEDEC code. (): ROHM Package, < >: GENERAL Code.

| Withstand Voltage V _{DS} [V] | ON Resistance R _{ON} typ. [mΩ] V _{GS} =15V | Reverse Recovery Time t _{rr} typ. [ns] | Package | | | |
|--|---|--|---|--|--|--|
| | | | TO-252 <DPAK> | (TO-220FM) <TO-220FP> | TO-220AB | TO-247AD (TO-247) |
| | | |  |  |  |  |
| 600 | 250 | 65 | ☆ R6013VND3 | ☆ R6013VNX | | |
| | 180 | 68 | | R6018VNX | | |
| | 130 | 80 | | R6024VNX | R6024VNX3 | |
| | 95 | 92 | | R6035VNX | R6035VNX3 | |
| | 59 | 112 | | ☆ R6055VNX | ☆ R6055VNX3 | R6055VNZ4 |
| | 42 | 125 | | | | R6077VNZ4 |
| | 22 | 167 | | | | ☆ R60A4VNZ4 |

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Application Examples

- EV charging stations, servers, base stations, solar power inverters (power conditioners), uninterruptible power supplies (UPS), Switched-Mode Power Supply (SMPS) and more
- White goods such as air conditioners
- Motor drives, power supply circuits, and the like

<PrestoMOS™>

‘Presto’ is an Italian musical term meaning ‘very fast’.

PrestoMOS™ is ROHM’s power MOSFET that leverages original lifetime control technology to deliver the industry’s fastest reverse recovery time (t_{rr}).

*PrestoMOS is a trademark of ROHM

Terminology

t_{rr} (Reverse Recovery Time)

The time the built-in diode needs to switch from the ON state to completely OFF. The lower this value, the smaller the loss during switching.

ON Resistance

The resistance value between the Drain and Source while the MOSFET is ON. The smaller this value, the lower the (power) loss during conduction.

Synchronous Rectification Boost Circuit

A boost circuit typically comprised of a MOSFET and diode in which the diode is replaced by a MOSFET to improve efficiency. A higher efficiency is achieved since the loss due to the ON resistance of the MOSFET is lower than the power loss resulting from the V_F of the diode.

