

## **Renesas Technology to Start Mass Production of 12-Product Lineup of Energy-Efficient Low-Loss Power MOSFETs that Cover Wide Voltage Tolerance Ranges (40 V, 60 V, 80 V, 100 V) ...**

Renesas

SAN JOSE, Calif., December 17, 2009—Renesas Technology America, Inc., today announced a lineup of 12 10th generation power MOSFET products for isolated DC-DC converters\*<sup>1</sup> used in the power supplies of applications such as servers, communications equipment, and industrial equipment. The new power MOSFETs deliver reduced switching loss\*<sup>2</sup> for improved energy efficiency and cover a wide voltage tolerance range (40 V, 60 V, 80 V, 100 V). Mass production began on December 3, 2009.

The 10th generation fabrication process employed for the 12 new products has a proven track record in earlier power MOSFETs (used mainly in non-isolated DC-DC converters) designed with a focus on on-resistance,\*<sup>2</sup> and it has been optimized to achieve a gate-drain charge (Qgd)\*<sup>3</sup> that is up to 50% lower than that of previous Renesas Technology products. The gate-drain charge (Qgd) is a key characteristic in achieving low switching loss in a power MOSFET. In addition, the high-performance package (Renesas Technology package code: LPAK) lowers package resistance and improves heat dissipation characteristics, boosting product performance still further and contributing to isolated DC-DC converters with higher efficiency and reduced energy consumption.

The features of the new power MOSFETs are as follows.

- ( Gate-drain charge approximately 50% lower than earlier Renesas Technology products (RJK1056DPB with 100 V voltage tolerance)  
To reduce the energy consumption of isolated DC-DC converters, there is demand for power MOSFETs with a lower gate-drain charge (Qgd), a key factor in achieving lower switching loss. The 12 new power MOSFETs are fabricated using Renesas Technology's 0.18  $\mu$ m 10th generation process, which has been optimized for this application. For example, the RJK1056DPB with 100 V voltage tolerance has a gate-drain charge of 7.5 nC, which is approximately half the 14.5 nC of Renesas Technology's earlier HAT2173H.
- ( Lineup covering wide voltage tolerance range (40 V, 60 V, 80 V, 100 V)  
The input and output voltages of an isolated DC-DC converter are determined by the voltage tolerance of the power MOSFETs used. In terms of the isolated components, an isolated DC-DC converter comprises a primary power supply as the input side and a secondary power supply as the output side. The lineup of new power MOSFETs includes products with a voltage tolerance of 80 V and 100 V, particularly in demand for the primary side, and products with a voltage tolerance of

40 V and 60 V, which are particularly in demand for the secondary side. Customers can choose the products that best meet their requirements.

( High-performance package for improved performance

The new power MOSFETs use Renesas Technology's proven LPAK (Renesas Technology package code)\*<sup>4</sup> high-performance package. It provides both low package resistance and excellent heat dispersion characteristics to prevent overheating of the element. In comparison with a conventional SOP-8 or the like, the package itself contributes to the low-loss characteristics of the product. Internal connections are made directly to a frame, reducing package inductance and ensuring suitability for high-frequency operation.

## < Product Background >

In recent years, growing demand for servers accompanying the increasing popularity of computers, and a rise in demand for communications equipment accompanying the popularization of mobile phones and the Internet, have spurred a corresponding growth in demand for isolated DC-DC converters for use in the power supplies of such equipment. At the same time, there is rising demand for improved efficiency in isolated DC-DC converters and power supplies due to concerns related to global warming and energy conservation. This has led to demand for reduced switching loss in the power MOSFETs used to build isolated DC-DC converters.

In response to this demand, Renesas Technology has produced MOSFET products with a focus on low on-resistance, lowering loss through the use of a trench gate fabrication process, package improvements, etc. These MOSFETs are used in a wide range of products.

The new power MOSFETs employ an optimized 10th generation fabrication process in response to demand for isolated DC-DC converters with still lower loss characteristics. They reduce the gate-drain charge (Qgd), which is key to switching loss characteristics, by up to 50% compared with Renesas Technology's 8th generation products. To suit a variety of applications, these products are available in several voltage tolerances: 40 V, 60 V, 80 V, and 100 V.

## < Notes >

Notes:

1. Isolated DC-DC converter: A type of power supply unit used principally in applications such as servers and communications equipment. Generally speaking, alternating current (AC) input is converted internally by the equipment to a direct current (DC) reference voltage, which is then converted to specified DC voltages for individual circuit blocks. The conversion from the reference voltage to a specified DC voltage is performed by a part of the power supply called a DC-DC converter. The type of DC-DC converter in which the input and output are isolated from one another is called an isolated DC-DC converter.
2. Switching loss and on-resistance: Switching loss refers to the power loss that

occurs when a power MOSFET switches between the ON and OFF states. On-resistance, on the other hand, is the operating resistance when the power MOSFET is in the ON state. Both are key characteristics determining the performance of a power MOSFET, and for both smaller values indicate higher performance. However, in practice there is a trade-off between switching loss and on-resistance, and it is generally difficult to achieve high performance in both parameters at the same time.

3. Gate-drain charge (Qgd): A power MOSFET characteristic that indicates the amount of electricity charged (discharged) by the gate when switching from OFF to ON (ON to OFF). When the charge is smaller the switching time is shorter, reducing the switching loss.
4. LPAK (Renesas Technology package code): LPAK stands for “loss free package.” Renesas Technology developed this type of package, and it has a proven track record in mass production. It uses a configuration in which the top and bottom surfaces of the MOSFET chip, through which current flows vertically, are connected to a frame. This reduces the package resistance by half, to 0.5 mW from the 1 mW of conventional packages, and prevents the chip from overheating by allowing heat dissipation from the top and bottom surfaces. In addition, inductance is lower than in conventional packages employing wires, and this allows for high-frequency operation.

\* Product names, company names, or brands mentioned are the property of their respective owners.

## < Typical Applications >

- Isolated DC-DC converters: Servers, communications equipment, industrial equipment, etc.

## < Prices in USA > \* For Reference

Product Name	Sample Price
RJK0454DPB, RJK0654DPB, RJK0854DPD, RJK1054DPB	.85
RJK0455DPB, RJK0655DPB, RJK0855DPD, RJK1055DPB	1.00
RJK0456DPB, RJK0656DPB, RJK0856DPD, RJK1056DPB	1.10

## < Specifications >

Ta = 25°C

Product Name	Max. Rating		On-Resistance (VGS = 10 V)		Gate-Drain Charge	Gate Charge	Package
	VDSS [V]	ID [A]	Typ. [mW]	Max. [mW]	Qgd [nC]	Qg [nC]	

RJK0454 DPB	40	40	3.9	4.9	3.0	25	LFPAK
RJK0455 DPB		45	3.1	3.8	4.5	34	
RJK0456 DPB		50	2.6	3.2	6.0	39	
RJK0654 DPB	60	30	6.5	8.3	4.5	27	
RJK0655 DPB		35	5.3	6.7	6.5	35	
RJK0656 DPB		40	4.5	5.6	7.0	40	
RJK0854 DPB	80	25	10	13	4.5	27	
RJK0855 DPB		30	8.2	11	6.5	35	
RJK0856 DPB		35	6.9	8.9	7.0	40	
RJK1054 DPB	100	20	17	22	4.5	27	
RJK1055 DPB		23	13	17	7.0	35	
RJK1056 DPB		25	11	14	7.5	41	

**About Renesas Technology Corp.**

Renesas Technology Corp. is the world’s No.1 supplier of microcontrollers and one of the world’s leading semiconductor system solutions providers for mobile, automotive and PC/AV (Audio Visual) markets. It is also a leading provider of Power MOSFETs, Smart Card microcontrollers, RF-ICs, High Power Amplifiers, Mixed Signal Ics, System-on-Chip (SoC), System-in-Package (SiP) and more. Established in 2003 as a joint venture between Hitachi, Ltd. (TSE:6501, NYSE:HIT) and Mitsubishi Electric Corporation (TSE:6503), Renesas Technology achieved consolidated revenue of 702.7 billion JPY in FY2008 (end of March 2009). Renesas Technology is based in Tokyo, Japan and has a global network of manufacturing, design and sales operations in 16 countries with 25,000 employees worldwide. For further information, please visit <http://www.renesas.com> [1]

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**Links:**

[1] <http://www.renesas.com>

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