

For Immediate Release

May 23, 2019

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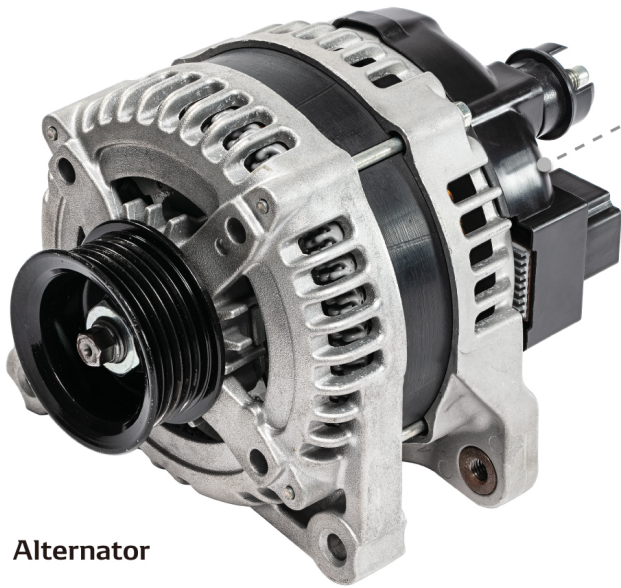
DENSO to Mass-produce Automotive Alternators Equipped with Newly Developed High-efficiency Diodes **– Developing a low-loss diode with Hitachi Power Semiconductor Device –**

KARIYA (Japan) — DENSO, the world's second largest mobility supplier, today announced that it has developed a high-efficiency diode for alternators for gasoline and diesel engine vehicles with the semi-conductor supplier, Hitachi Power Semiconductor Device, Ltd. Production of alternators equipped with newly developed diodes will start for vehicles to be sold in Europe in FY2019, and will be rolled out to manufacturing group companies around the world.

Diode is a components of alternators. Diode has function to flow current in a certain direction and rectifying generated alternating current to direct current. The jointly developed diode significantly reduces the power conversion loss by increasing the efficiency of the function. The new diode improves the power generation efficiency by about 6% compared to conventional products and help improving fuel consumption. DENSO manufactures 25 million alternators in annual total in more than 10 countries. If all the diodes were replaced with the new high-efficiency diodes, carbon dioxide emissions would be reduced by 30 tons annually.

The new diode is developed as a component that fits the conventional alternator. DENSO and Hitachi remained the conventional shape of the diode and increased the efficiency of rectifying function by simplifying IC control function and applying 3D design located IC tip sterically.

Although vehicles are being increasingly electrified, the internal combustion engine (ICE) with an alternator still accounts for 80% globally. DENSO markets and distributes products for swiftly improving the environmental performance of ICE vehicles to help create a sustainable society.



Alternator



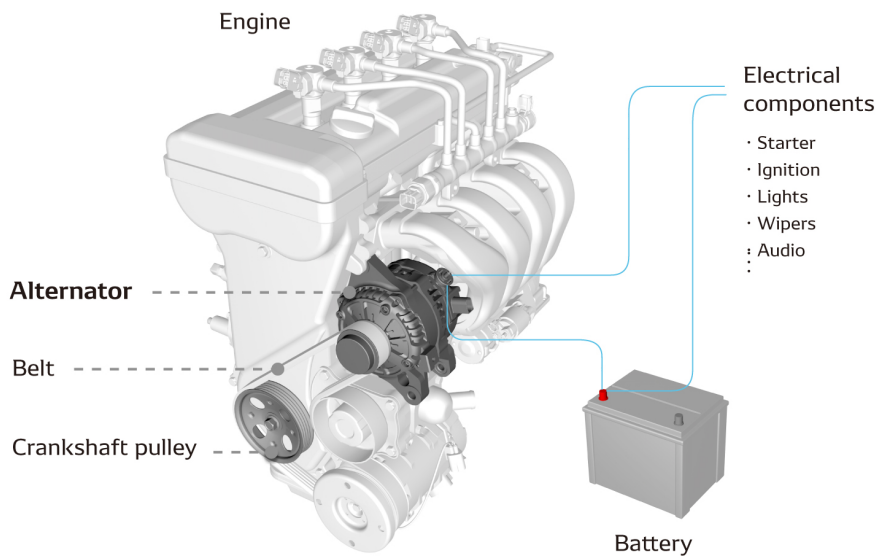
**High-efficiency diode
for alternators**

Twelve diodes are used per alternator.

About an alternator

An alternator is an important component that generates electricity using the power of the engine and supplies electricity to all the electrical components in a vehicle. The electricity remaining after consumption by electrical components is sent to a battery for storage.

An alternator is connected to the crankshaft of the engine via a pulley and belt, and generates electricity using engine torque. Improving the power generation efficiency of the alternator reduces the engine torque load and increases the fuel efficiency of the vehicle.



About DENSO's Electrification Development

DENSO has been developing electrification technologies as a priority to create the future of mobility. The company has also been developing key components for electrified vehicles such as motor generators (MGs) and elements of Silicon Carbide (SiC) for inverters.



DENSO contributes to the sustainable development of society.

About DENSO

DENSO is a \$48.3 billion global mobility supplier that develops advanced technology and components for nearly every vehicle make and model on the road today. With manufacturing at its core, DENSO invests in its 221 facilities in 35 countries to produce thermal, powertrain, mobility, electrification, & electronic systems, to create jobs that directly change how the world moves. The company's 170,000+ employees are paving the way to a mobility future that improves lives, eliminates traffic accidents, and preserves the environment. Globally headquartered in Kariya, Japan, DENSO spent 9.3 percent of its global consolidated sales on research and development in the fiscal year ending March 31, 2019. For more information about global DENSO, visit <https://www.denso.com/global>.

In North America, DENSO employs 27,000+ engineers, researchers and skilled workers across 31 sites in the U.S, Canada and Mexico. In the United States alone, DENSO employs 17,000+ employees across 13 states and 25 sites. Headquartered in Southfield, Michigan, in fiscal year ending March 31, 2019, DENSO in North America generated \$10.9 billion in consolidated sales. Join us, and craft not only how the world moves, but also your career. For more information, go to <https://www.denso.com/us-ca/en/>.