

# Toshiba delivers world's first propulsion system integrating PMSM and SiC diode to Tokyo metro

September 24 2014

---



Totally enclosed Permanent Magnet Synchronous Motor (PMSM)



Silicon carbide (SiC) Variable Voltage Variable Frequency (VVVF) traction inverter

Toshiba Corporation today announced that it has delivered the world's first train propulsion systems incorporating totally enclosed Permanent Magnet Synchronous Motors (PMSM) and silicon carbide (SiC) Variable Voltage Variable Frequency (VVVF) traction inverters. The propulsion systems were delivered to Japan's Tokyo Metro Co., Ltd. for Ginza Line 1000 third series trains. The details of technology were explained by Tokyo Metro today at Toshiba booth in InnoTrans, international transport technology trade fair on transport technology taking place in Berlin this week.

The new propulsion systems offer enhanced power saving performance.

Integration of a filter reactor, a control system to eliminate current noise, supports the system in reducing powering, acceleration of the train caused by delivery of power supply, by approximately 4%, and improving regenerated energy by approximately 3%, compared to Ginza Line 1000 first series trains incorporating a PMSM main circuit system. Compared to the induction motor (IM) main circuit system incorporated in Ginza Line 01 series trains, the new system cuts overall power consumption by approximately 37%.

The totally enclosed PMSM is a highly efficient main motor that achieves a rated efficiency of 97%, a significant improvement over the open type IM's widely used in trains, which have a rated efficiency of 90%. The PMSM are also easier to maintain, as its totally enclosed design eliminates potential internal contamination, ending the need for cleaning the course of its service life.

For the VVVF inverter that drives the main motor, Toshiba has developed and manufactured an SiC diode that operates at high temperatures with low heat generation and loss characteristics.

Toshiba is a supplier of highly energy efficient propulsion systems to multiple train operators in Japan and overseas. In Japan, in addition to the Tokyo Metro's Ginza Line, Toshiba systems are in use on Tokyo Metro's Chiyoda Line, Marunouchi Line and Tozai Line. Overseas, trains incorporating a Toshiba propulsion system will enter service in Singapore in 2015 and after.

Building on its record in Japan and in overseas, Toshiba will continue to develop end-to-end technologies, from device to systems, in its power electronics business, and proactively promote its high energy efficiency, compact products in the world market.

Provided by Toshiba Corporation

Citation: Toshiba delivers world's first propulsion system integrating PMSM and SiC diode to Tokyo metro (2014, September 24) retrieved 2 May 2024 from

<https://phys.org/news/2014-09-toshiba-world-propulsion-pmsm-sic.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.