



Railcar Traction Inverter with All-SiC Power Module



The amount of regenerative electric energy is increased by reducing power loss.

World's first ^{※1}

**All-SiC
Power
Module**

applied

Energy Consumption ^{※1}

40%

reduction

Total energy consumption of railcar systems, including traction motors, is reduced by about 40%.^{※2}

Size and Weight

65%

reduction

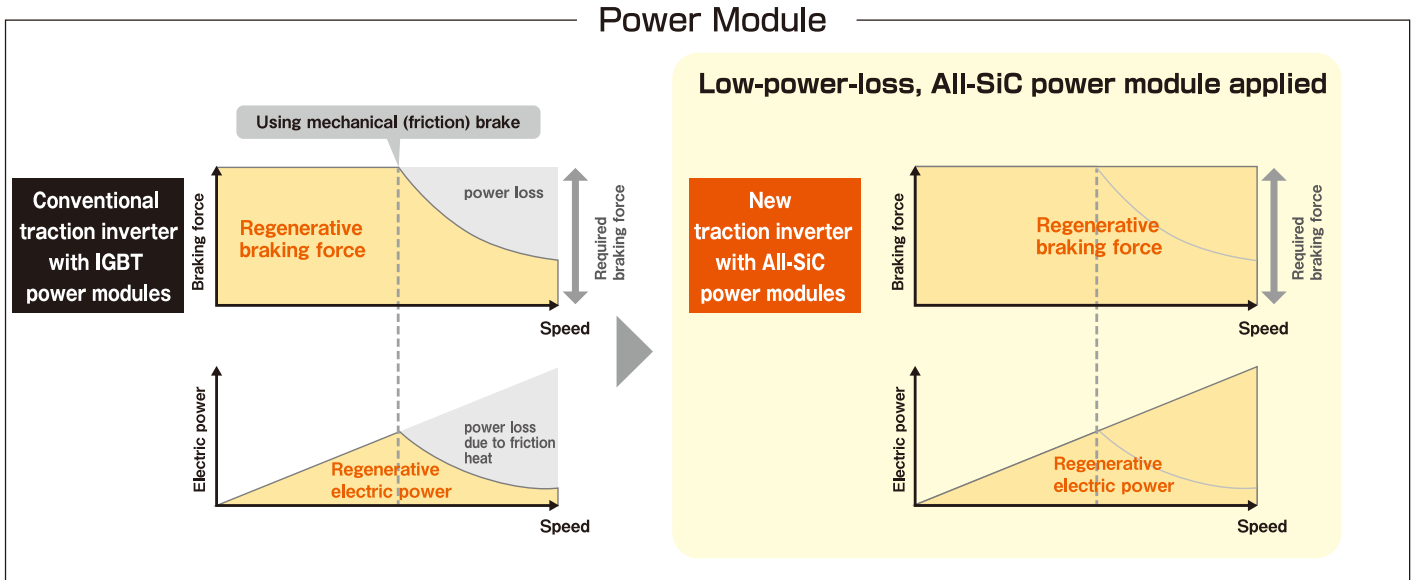
Size and weight are reduced by about 65%.^{※3}

※1 As of Dec, 2013 ※2 Comparison of conventional traction inverter on Odakyu Electric Railway series 1000, with GTO power modules
 ※3 Comparison of conventional traction inverter with IGBT power modules

■ Specifications of Main Circuit

Input voltage	1,500V DC	Control system	Four traction motors with 180kW
Main circuit system	Two-level PWM inverter with regenerative brakes	Cooling system	Self-cooling

Railcar Traction Inverter with All-SiC Power Module

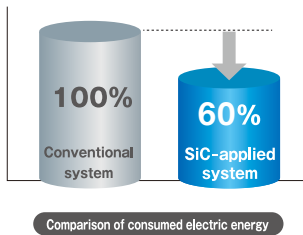


Optimized schematic circuit system

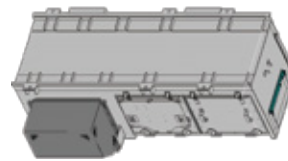
Compact size and lightweight

- Inverter loss is about 55% less than conventional inverter.*
- Total energy consumption of railcar systems is reduced by about 40%.*

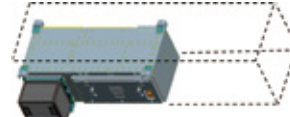
- Size and weight are reduced by about 65%.*



Conventional traction inverter with IGBT power modules



New traction inverter with All-SiC power modules



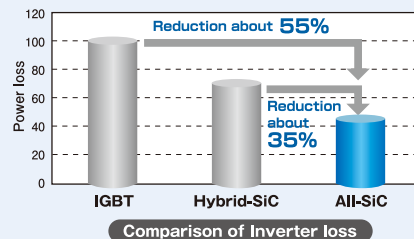
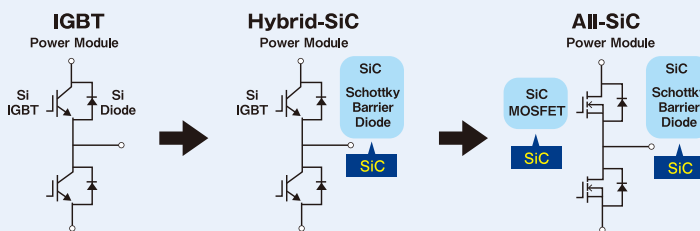
* Comparison of conventional traction inverter with IGBT power modules

*Comparison of conventional traction inverter on Odakyu Electric Railway series 1000, with GTO power modules

About SiC power module

Successful development of 3.3kV/1500A All-SiC power modules was achieved by applying SiC not only to diodes but also transistors.

Inverter power loss is about 55% less than conventional inverters, and about 35% less than hybrid-SiC inverters.



— This work partially employs the achievements of the METI&NEDO project conducted by FUPET.* —

*METI : Ministry of Economy, Trade and Industry NEDO : New Energy and Industrial Technology Development Organization FUPET : R&D Partnership for Future Power Electronics Technology

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