



**Inverters for Engine Generators Total Shipment of More Than 2 Million Units!**  
 ~Shindengen technology offers support in the engine generator market~

## Background

An engine generator internally converts the AC power, acquired from the alternator output during engine operation, into DC, and then into a single phase AC sine wave with the same quality as commercial power supply. Engine generators are not only used for leisure activities and construction sites, but also as a back-up resource for emergency services during a disaster. Recently, they are also attracting attention as a valuable resource for power supply in developing countries with unstable power source.

Shindengen began mass production of inverters for engine generators in 1998, and we broke the 2 million unit mark for total units shipped to date in FY2010.

Highly reliable, and efficient Shindengen inverters, developed by integrating power supply circuit technology, semiconductor technology and module (mounting) technology, generate the same high quality power that is found in commercial power supply and support the use of equipments that are sensitive to frequency and voltage fluctuation. They also have a built-in load monitor/engine controller that changes the engine rpms according to load being used, which allows fuel efficiency in any range.

## Amazing Technology Overview

- Highly efficient power supplies developed by merging power supply circuit technology, semiconductor technology and module (mounting) technology
- Good quality AC waveform created by original digital technology
- High thermal dissipation and downsizing achieved through optimization of the structural configuration

## Amazing Technology Details

[Features of Shindengen's Original MOSFET]

- Equipped with Shindengen original MOSFET, optimized for use in inverter by our original technology of power supply circuit and semiconductor
  - Highly efficient inverters achieved through pinpoint design of VDS and ID that match the circuit specification
  - Improved performance : low RDS(on) × Qg , low conduction loss × switching loss
  - Improved MOSFETs' durability for high reliability of the inverter
    - ⇒ Unique original process and stripe cell structure that increases the di/dt durability
    - Realizing a di/dt = 2000 A at TC = 150° C, and ensuring an internal uniform current during device operation.



**Power module section of sine wave inverter**

[Digital Technology]

- Superior sine waveform provided by optimal control utilizing our digital technology
  - Maximum output power supply realized by high speed computational processing, which includes internal protection functionality
  - Equipped with a high-precision inverter control microcomputer which enables the creation of an AC waveform with the same quality as commercial power supply

[3D Structure & High Density Installation Contribute to Downsizing]

- High density patterns and high heat dissipation achieved through 3D structures on the power and control sections
  - Great size reduction by utilizing bare chips of power semiconductors (module technology) in the power supply sections onto the metal base boards with high heat dissipation.

[Product lineup]

Rated output power		1KVA	2KVA	3KVA
Installation location		Inside the generator housing		
Installation location (Performance guaranteed)		-20°C to 60°C		
Operation temperature range (Operation guaranteed)		-30°C to 80°C		
Method	Inverter	PWM control		
	Cooling method	Forced-air cooling		
AC output	No. of phases	Single phase		
	Rated voltage [V]	100, 120, 220, 230		
	Rated frequency [Hz]	50/60		



**Our newly developed inverter**

## Future Outlook and Technological Trends

Shindengen began selling inverters for consistent electrical power supply on engine generators in 1998. We are proud to announce that we have broken the 2 million unit mark for total shipped units to date and that we hold a high share in the inverter market for engine generators on a global level.\*<sup>1</sup>

Shindengen will also continue to provide support in the future for market needs in downsizing, higher efficiency and reductions in cost. In addition, we shall continue to explore the interconnection with input systems for solar power, which is gaining popularity as a new energy, and we would like to contribute in supporting the new needs and in forming new markets.

\*<sup>1</sup>According to internal study