

新電元工業株式会社が紹介したい技術 Technologies that Shindengen Electric Manufacturing Co., Ltd. wants to introduce

次世代のパワーエレクトロニクスを支えるSiC（シリコンカーバイド）デバイス

SiC (Silicon Carbide) devices, which support the next generation of power electronics

2026/6/12

Trade Name	Shindengen Electric Manufacturing Co., Ltd.
Address	Shin-Otemachi Bldg., 2-2-1 Otemachi, Chiyoda-ku, Tokyo 100-0004, Japan
Established	August 16, 1949
Capital	\ 17,823,148,008
Main Business	Manufacturing and sales of semiconductors, car electronics products, and power supply products
Asaka Office Address	3-14-1 Saiwai-cho, Asaka City, Saitama 351-8503, Japan

Main Customer

ADVANTEST Corp.
NEC Group
NTT Group
OMRON Corp.
Kawasaki Heavy Industries Group
Canon Group
KDDI Group
KOITO MANUFACTURING CO., LTD.
SIIX Corp.

Sharp Group
SUZUKI MOTOR Group
STANLEY ELECTRIC CO., LTD.
SUBARU Corp.
Sumitomo Wiring Systems Group
Sony Group
SOFTBANK Group
Daikin Industries Group
TDK Group

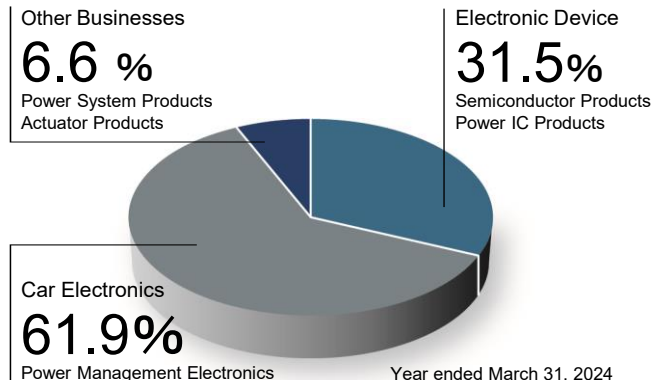
TOSHIBA Group
TOYOTA Group
NISSAN Group
NIPPON SEIKI CO., LTD.
PIONEER Corp.
Panasonic Group
Hitachi Group
FANUC LTD.
FUJITSU Group

Honda Group
Marelli Corp.
Mitsuba Group
Mitsubishi Group
Yazaki Group
YASKAWA Electric Corp.
YAMAHA MOTOR Group

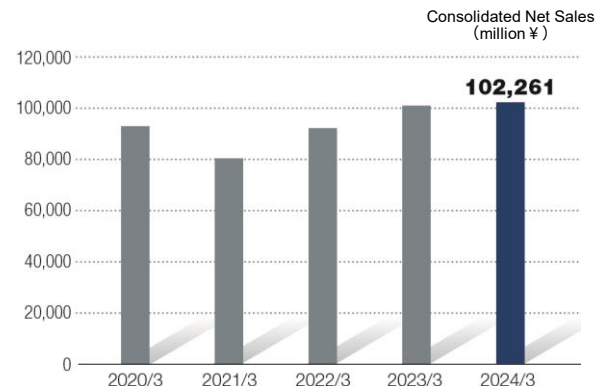
BMW Group
BOMBARDIER RECREATIONAL PRODUCTS INC.
DELTA Group
DUCATI MOTOR HOLDING S.P.A
KTM-SPORTMOTORCYCLE AG
LG Group

PHILIPS Group
PIAGGIO Group
POLARIS INDUSTRIES INC.
SAMSUNG Group
TRIUMPH MOTORCYCLES LTD.

Share of Total Sales

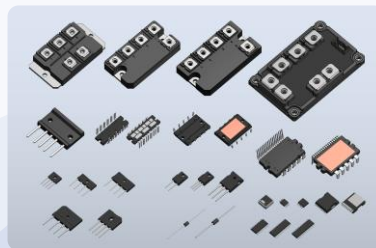


Net Sales



Maximizing Energy Conversion Efficiency

Power Device Business



- Bridge Diodes
- High Speed Rectifier Diodes
- TVS (Transient Voltage Suppressor)
- Thyristors
- SIDACs
- Power MOSFETs
- Power ICs
- Power Modules



Core Technology

Packaging Technology

Circuit Technology

Device Technology



- Regulators for Motorcycles
- ECUs for Motorcycles
- Igniters for Motorcycles (CDIs)
- DC/DC Converters for Four-wheel Vehicles
- ECUs for Four-wheel Vehicles
- Sine Wave Inverters for Portable Generators
- Chargers for EV/PHEV (AC/Quick)

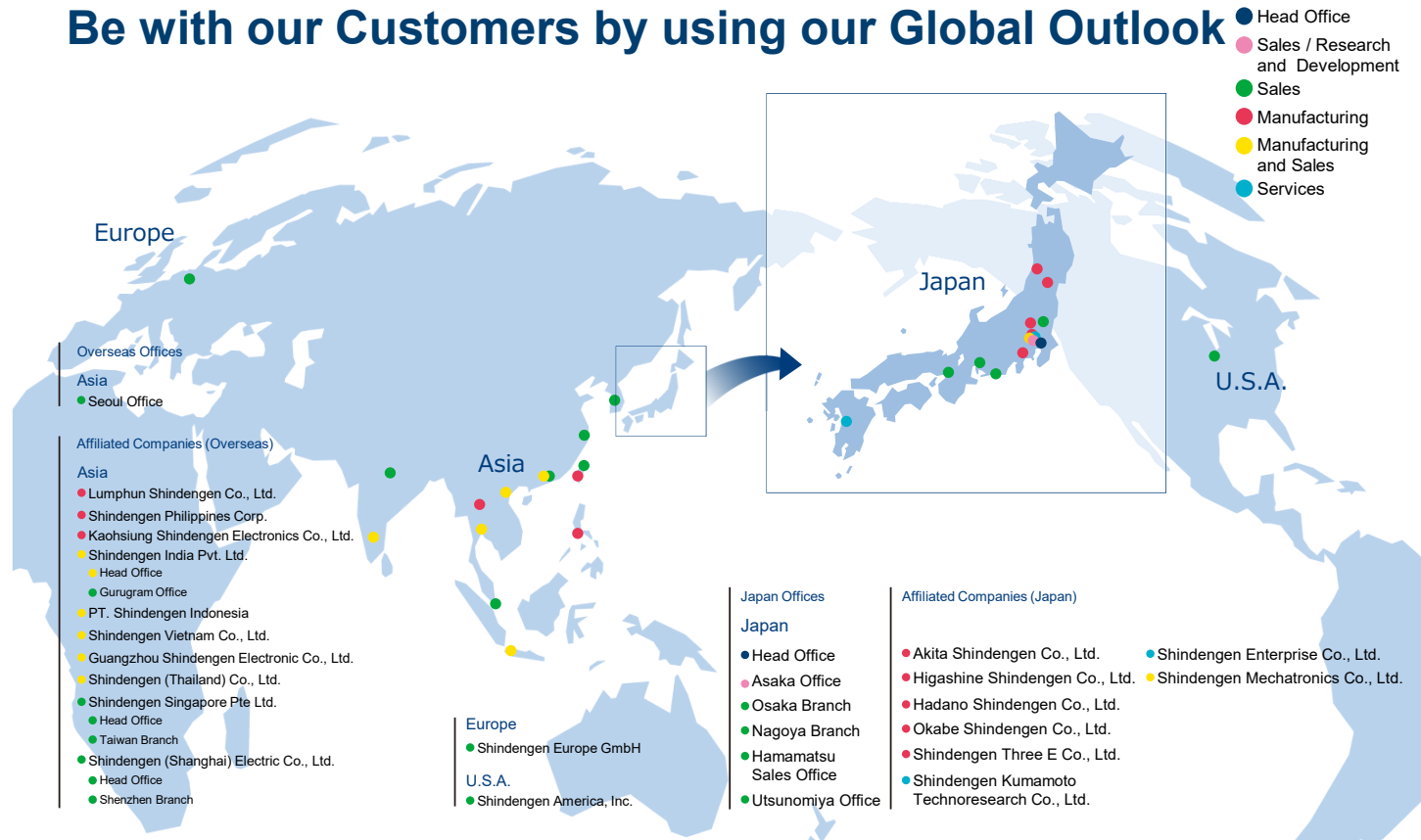
- Rectifiers for Communication Stations
- Rectifiers for Mobile Phone Base Stations
- Inverters for Communication Stations
- Monitoring Units
- Lithium-ion Battery System
- V2X Bidirectional Charger interconnected device



Power Unit Business

Power Systems & Solutions Business

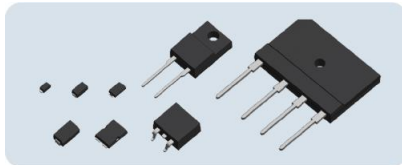
Be with our Customers by using our Global Outlook



Generating Power Supply Potentials with Semiconductors

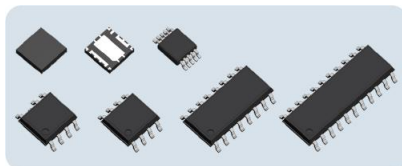
- Top market share with bridge diodes
- High efficiency and power saving Power MOSFETs and ICs

【Our Products】



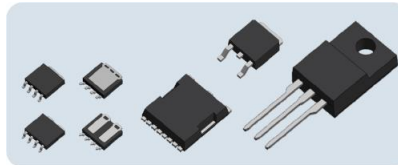
Diodes & TVS

We offer a wide variety of diode products including various bridge diodes with industry-leading performance, a broad lineup of high-speed diodes and Schottky barrier diodes, high withstand voltage / low VF / high ESD general rectifying diodes, and more. TVS for surge absorption are also proposed to meet the requirements for high-voltage and high-reliability protection elements in various markets and applications.



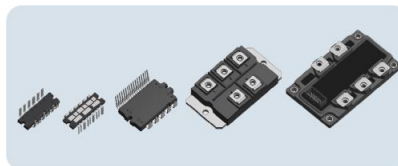
Power ICs

We offer a diverse range of products including power supply IC, motor drive driver IC, reverse connection / reverse current protection ideal diode IC, and more, which realize high efficiency, low dissipation, and downsizing.



Power MOSFETs

Shindengen Electric Manufacturing Co., Ltd.'s power MOSFET are available in a broad lineup covering everything from low to high withstand voltage. The low withstand voltage series has industry-leading Qg characteristics, and the high withstand series has the industry-leading high breakdown voltage characteristics.



Power Modules

Shindengen Electric Manufacturing Co., Ltd. offers a wide selection of products, including motor drive power modules and large capacity bridge diode modules, which realize higher device performance and lower energy consumption while also contributing to improved productivity and system reliability.



TOPICS

For maximizing energy conversion efficiency

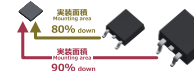
Ideal diode IC [MF2003SV V-Diode™] with reverse connection and reverse current protection.



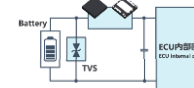
We offer ideal diode IC for reverse connection / reverse current protection applications in vehicle and industrial device control unit input parts and other uses. Compared with general diodes, conduction losses can be significantly reduced and circuit miniaturization can be achieved. Contributes to low dissipation and downsizing for reverse connection / reverse current protection circuits which are required for higher performance and larger current in vehicle and industrial devices.

MF2003SV
V-Diode™
WSON package

ダイオード例
Diode example
40V/15A
TO-252



理想ダイオードIC
[MF2003SV V-Diode™]
Ideal diode IC [MF2003SV V-Diode™]



紹介したい技術

The technologies I'd like to introduce



今回紹介したい技術はSiC（炭化ケイ素）デバイスです。炭化ケイ素は、ケイ素（Si）と炭素（C）からなる化合物であり、シリコンの約10倍の絶縁破壊電界強度、3倍のバンドギャップ、高い熱伝導率を持つ次世代パワー半導体材料です。

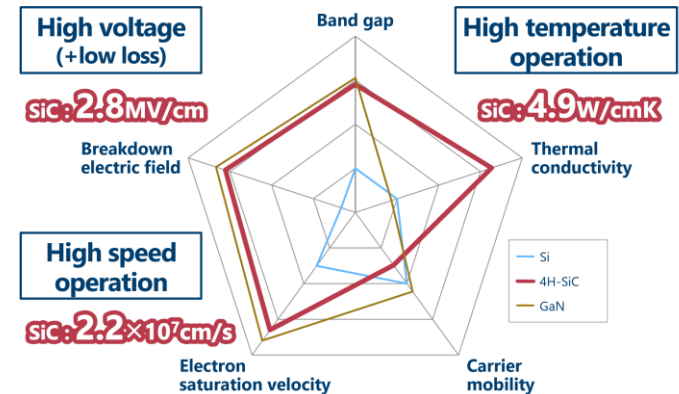
The technology I'd like to introduce today is SiC (silicon carbide) devices. Silicon carbide is a compound made of silicon (Si) and carbon (C), and is a next-generation power semiconductor material with approximately 10 times the dielectric breakdown field strength, three times the band gap, and high thermal conductivity of silicon.

SiCデバイスの特長 ～優れた半導体性能～

Features of SiC devices– Superior Semiconductor Performance –

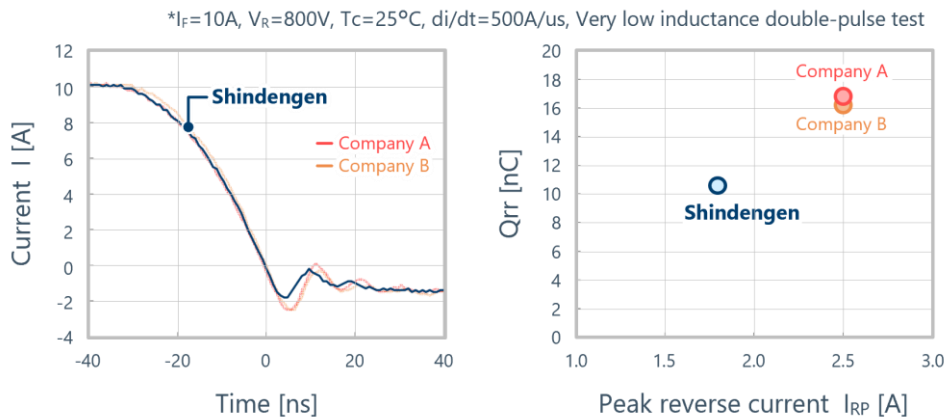
高効率・高耐圧・高温動作が可能なSiCデバイスは、産業機器から電気自動車、再生可能エネルギー分野まで、幅広い用途で注目を集めています。

With high efficiency, high voltage resistance, and the ability to operate at high temperatures, SiC devices are attracting attention across a wide range of applications from industrial equipment to electric vehicles and renewable energy sectors.



SiC-SBDは、超高速リカバリ特性（trr低減）、高耐圧・高温動作対応といった特長を備え、スイッチング損失の大幅な削減と高効率化を実現します。

SiC-SBDs feature ultra-fast recovery characteristics (reduced trr), high voltage resistance, and high-temperature operation, enabling significant reductions in switching losses and improved efficiency.



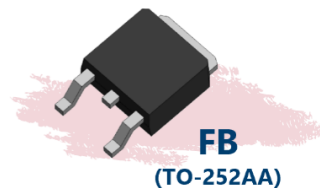
1200V耐圧品のリカバリ特性

Recovery characteristics of 1200V withstand voltage products

製品紹介 (SiCショットキバリアダイオード)

Product Introduction (SiC Schottky Barrier Diodes)

Surface Mount Package (FB)



■ Features

- New SiC-SBD (Low V_F)
- Automotive applications also available

(planned)

■ Applications

- Secondary-side rectification
- Reverse current prevention
- Power factor correction (PFC/Continuous

mode)

...etc.

面実装型パッケージ (FB)

■ 特長

- 新SiC-SBD (低 V_F 化)
- 車載用途も対応可能 (予定)

■ 用途

- 二次側整流用
- 逆流防止用
- 力率改善(PFC/連続モード)用 ...など

Products	絶対最大定格 Absolute maximum ratings ($T_c=25^\circ\text{C}$)				電気的・熱的特性 Electrical & thermal characteristics ($T_c=25^\circ\text{C}$)				Automotive	Status
	T_J [°C]	I_F (AV) [A]	V_{RRM} [V]	I_{FSM} [A]	V_F Typ. [V] ($I_F=6\text{A}$)	I_R Max. [uA] ($V_R=650\text{V}$)	t_{rr}/Q_{rr} Typ. [ns]/[nC]	$R_{th(j-c)}$ Max. [°C/W]		
WS6FB65BK	-55~175	6	650	***	1.35 ($I_F=6\text{A}$)	***	***	***	●	Planning
WS10FB65AK	-55~175	10	650	43	1.49 ($I_F=10\text{A}$)	50 ($V_R=650\text{V}$)	6.7 / 5.7	4.5	●	ES 2026/10 mass production
WS16FBC65AK	-55~175	16	650	46	1.38 ($I_F=8\text{A}$ per diode)	50 ($V_R=650\text{V}$ per diode)	6.7 / 5.7 (Per diode)	3	●	ES 2026/10 mass production
WS16FB65AK	-55~175	16	650	70	1.36 ($I_F=16\text{A}$)	100 ($V_R=650\text{V}$)	10.0 / 12.7	3.2	●	ES 2026/10 mass production

***: TBD

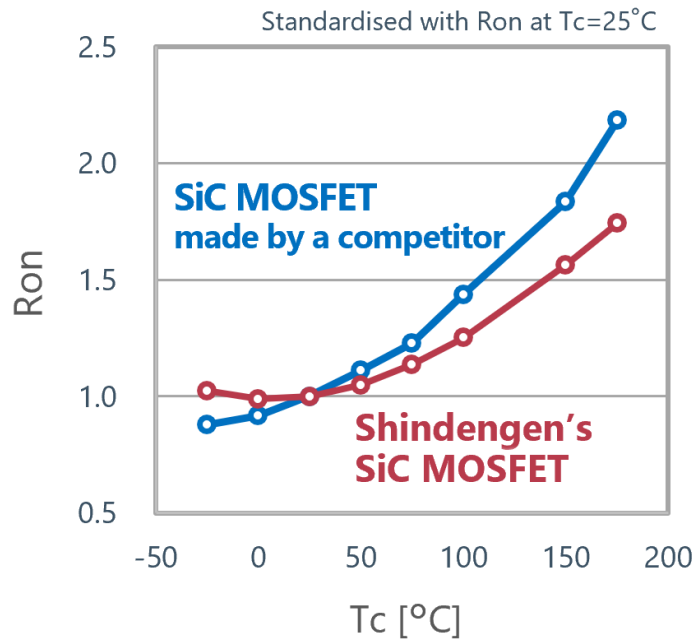
SiC-MOSFETはスイッチング損失が低く、高温動作に優れ、高速動作が可能です。

さらに低オン抵抗のため、従来のスイッチング素子であるIGBTの置き換えとして650V以上の領域におけるインバータ、コンバータなどで機器や冷却ユニットの小型化に貢献します。

SiC-MOSFETs feature low switching losses, excellent high-temperature performance, and enable high-speed operation.

Furthermore, due to their low on-resistance, they serve as a replacement for conventional switching devices such as IGBTs in applications above 650V, contributing to the downsizing of equipment and cooling units in inverters and converters.

Ron-Tc (1200V model, $V_{GS}=18V$)

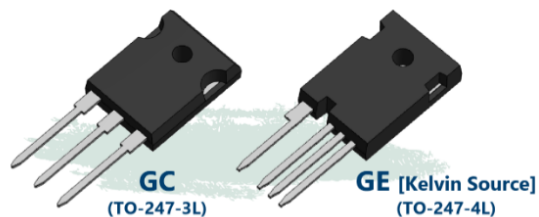


製品紹介 (SiC-MOSFET)

Product Introduction (SiC-MOSFETs)

挿入型パッケージ (GC/GE)

Through hole device (GC/GE)



Products	Package	絶対最大定格 Absolute maximum ratings (T _c =25℃)			電氣的・熱的特性 Electrical & thermal characteristics (T _c =25℃)		Auto motive	Status
		T _{CH} [℃]	V _{DS} [V]	I _D [A]	V _{TH} Typ. [V]	R _{DS(ON)} Typ [mΩ]		
WP80GC65A	GC (TO-247AD)	-55~175	650	80	3.0	18		DS 27/3 mass production
WP60GC65A	GC (TO-247AD)	-55~175	650	60	3.0	28		DS 27/3 mass production
WP38GC65A	GC (TO-247AD)	-55~175	650	38	3.0	50		DS 27/3 mass production
WP33GC65A	GC (TO-247AD)	-55~175	650	33	3.0	63		DS 27/3 mass production
WP80GES75AK	GE [Kelvin Source] (TO-247-4L)	-55~175	750	80	3.0	18	●	DS 27/5 mass production
WP60GES75AK	GE [Kelvin Source] (TO-247-4L)	-55~175	750	60	3.0	28	●	DS 27/5 mass production
WP38GES75AK	GE [Kelvin Source] (TO-247-4L)	-55~175	750	38	3.0	50	●	DS 27/5 mass production
WP33GES75AK	GE [Kelvin Source] (TO-247-4L)	-55~175	750	33	3.0	63	●	DS 27/5 mass production
WP65GES120AK	GE [Kelvin Source] (TO-247-4L)	-55~175	1200	65	3.0	24	●	DS 27/5 mass production
WP55GES120AK	GE [Kelvin Source] (TO-247-4L)	-55~175	1200	55	3.0	36	●	DS 27/5 mass production
WP35GES120AK	GE [Kelvin Source] (TO-247-4L)	-55~175	1200	35	3.0	65	●	DS 27/5 mass production
WP30GES120AK	GE [Kelvin Source] (TO-247-4L)	-55~175	1200	30	3.0	80	●	DS 27/5 mass production

日本語：

<https://gosfp.shindengen.co.jp/jp/contact/semi>



English:

<https://www.shindengen.com/contact/semi/>



書誌情報

名称：半導体装置の製造方法および半導体装置

出願日：2013年6月14日

特許番号：5802333（日本）

MY-183542-A（マレーシア）

ZL201380077346.5（中国）

9245753（米国）

3010036

（ドイツ、オーストリア、イタリア）

THE BIBLIOGRAPHIC INFORMATION

Title : Method for manufacturing a semiconductor device and a semiconductor device.

Application date : June 14, 2013

Patent number:5802333(Japan)

MY-183542-A(Malaysia)

ZL201380077346.5(China)

9245753(U.S.A)

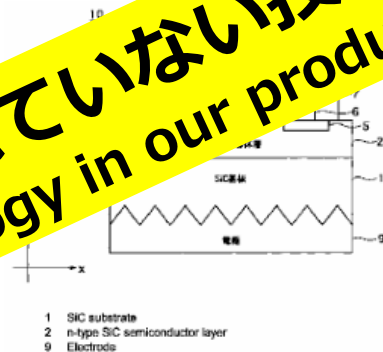
3010036

(Germany, Austria, Italy)

利用シーン（展開可能分野） Usage scenarios (applicable fields)

従来より安価なレーザでワイドバンドギャップ半導体基板に対してオーミック接触を得たい半導体装置の製造方法に有用。

This is useful for manufacturing semiconductor devices by obtaining ohmic contact with a wide-bandgap semiconductor substrate using a less expensive laser method.



発明の効果（新規性）

Effects of the invention (Novelty)

格子欠陥後に、波長が半導体の吸収波長よりも長い光を照射することで、ワイドバンドギャップ半導体基板に対してオーミック接触を得る。

After removing lattice defects, ohmic contact is obtained by irradiating with a wavelength longer than the absorption wavelength of the wide-bandgap semiconductor substrate.

想定するライセンシー像（保有技術や事業領域） Expected licensee profile (technology and business area)

炭化ケイ素（SiC）や窒化ガリウム（GaN）を代表するワイドバンドギャップを有する半導体のメーカーを想定。
This scenario assumes a manufacturer of semiconductors with a wide bandgap, such as silicon carbide (SiC) and gallium nitride (GaN).

注意：本特許は弊社製品群には含まれていない技術です。
Note: This patent does not include technology in our product line.

問い合わせ先（Contact us） : patent@shindengen.co.jp

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<https://wipogreen.wipo.int/wipogreen-database/articles/178451?query=shindengen&type=BASIC&pagination.page=0&pagination.size=10&sort.0.field=ALL&sort.0.direction=DESC>



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Thank you for your attention.**