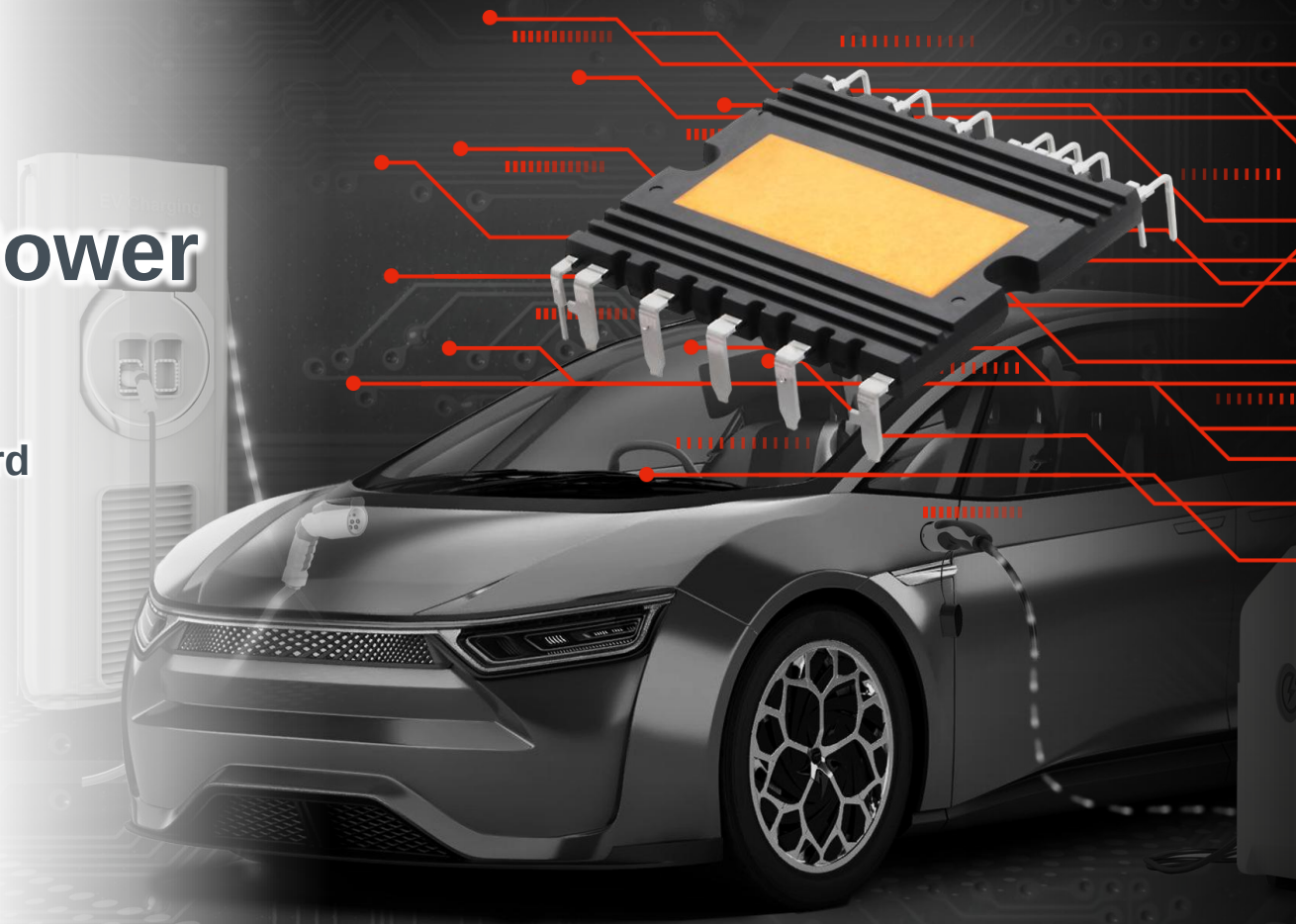
ROHM SEMICONDUCTOR

Electronics for the Future

EcoSiC

ROHM Develops New High-Power Density SiC Power Modules

Compact high heat dissipation design sets a new standard for OBCs



April 24, 2025
ROHM Co., Ltd.
Marketing Communications Dept.

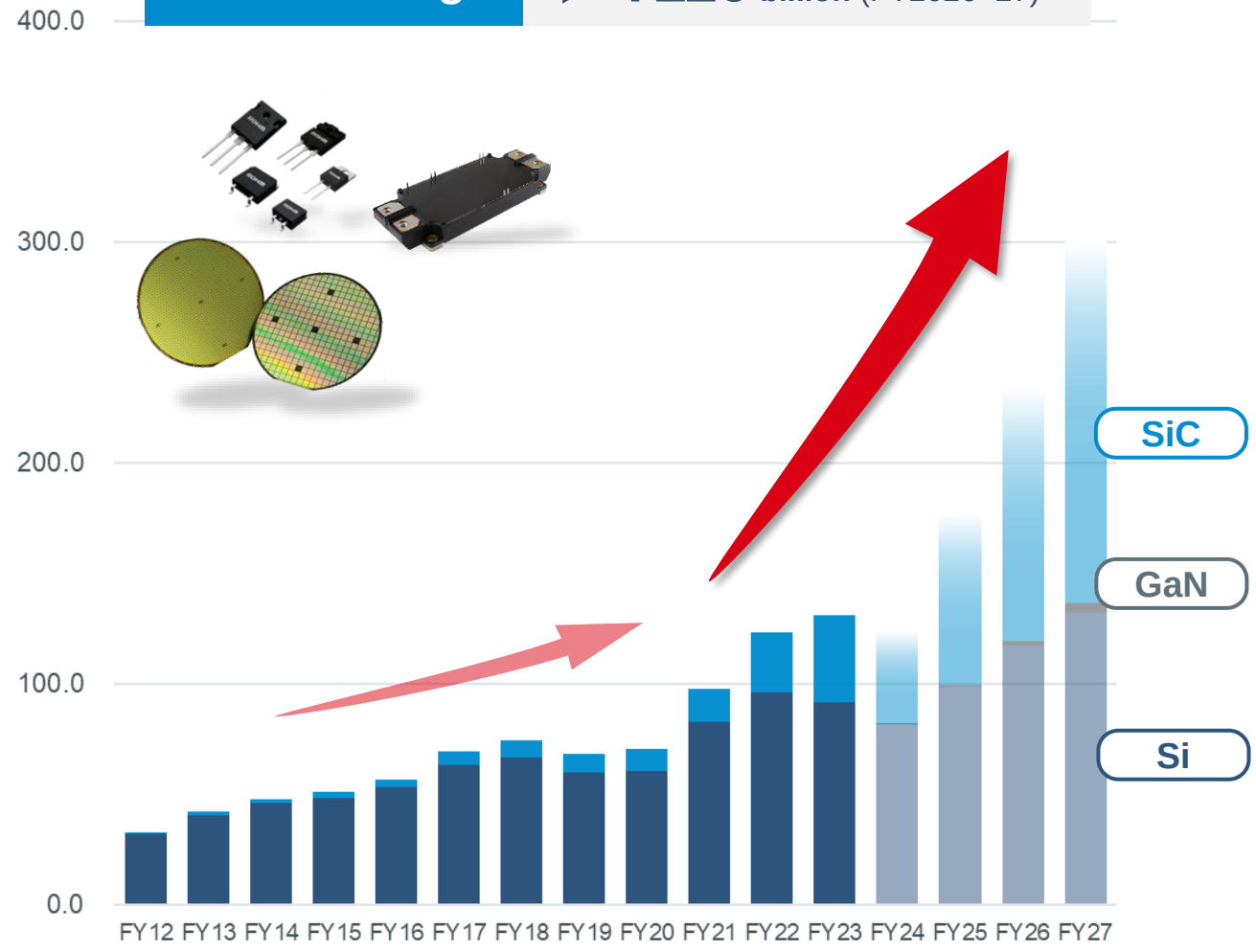
*ROHM Thursday, April 24, 2025 study

Sales Target for Power Device Business

*Excerpt from the financial data for the first half of fiscal year 2024

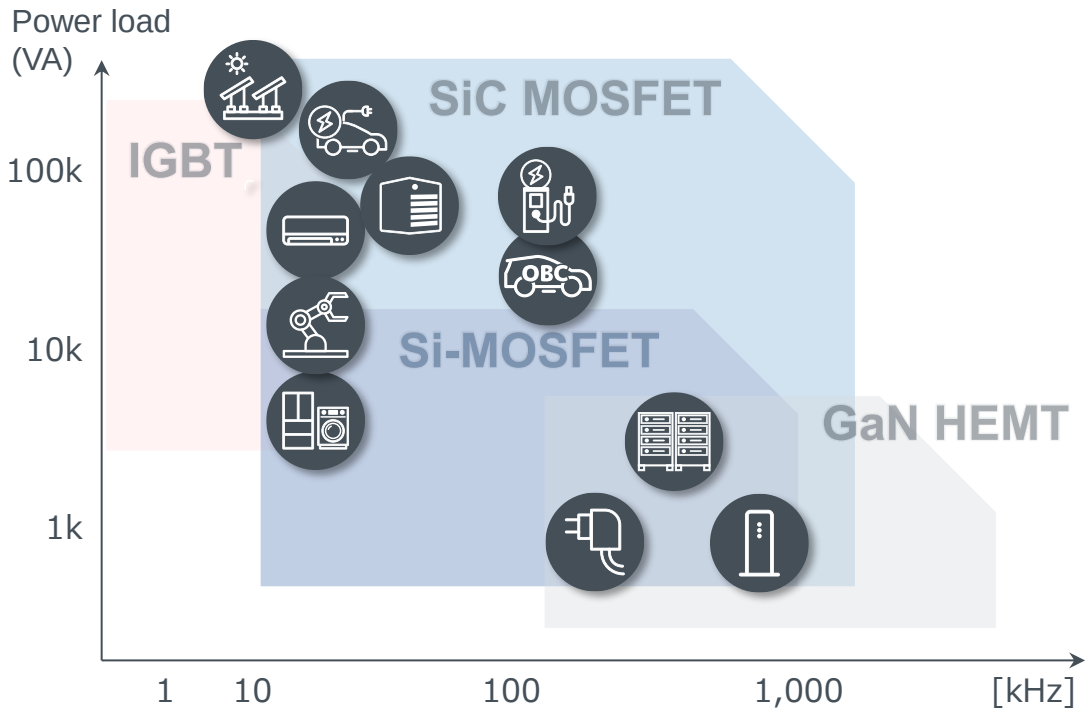
Sales Target for Power Device Business

SiC sales target ＞**¥110 billion** (FY2026~27)



*Forecasts are converted at ¥145

Range of Power Device Applications



SiC
- High power
- High voltage (＞600V)
- High frequency (20-200kHz)

GaN
- Middle power
- Middle voltage (100-600V)
- High frequency (Over 200kHz)

Design Wins for SiC Devices

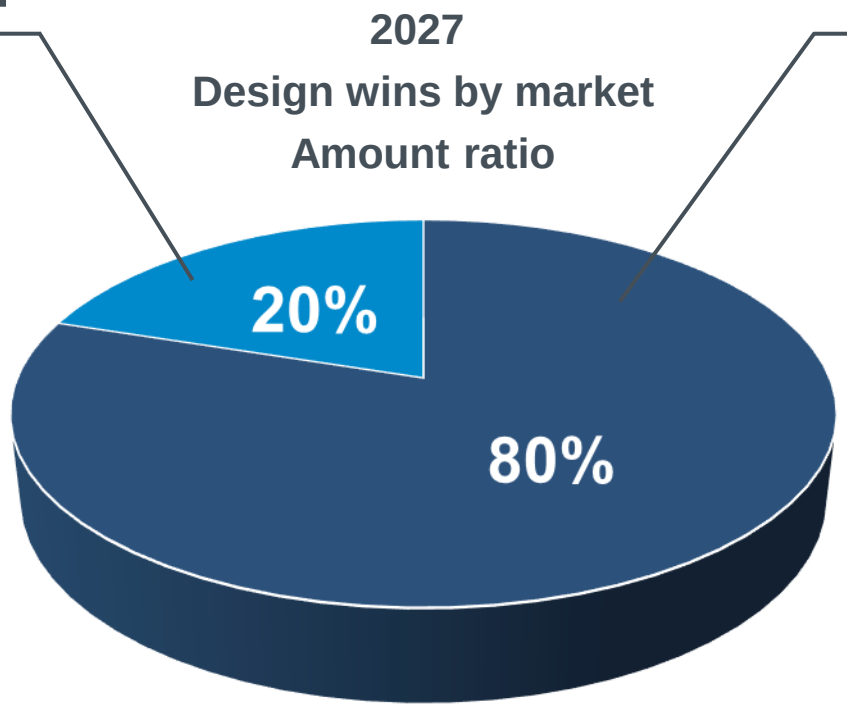
*Excerpt from the financial data for the first half of fiscal year 2024

Design-wins with over 140 companies achieved worldwide

Over 90 companies

Industrial, Other

ABB
ALSTOM
APEX MICROTECHNOLOGY
COSEL
DELTA
GENERAC
GOODWE Smart Energy Innovator
GS YUASA
nichicon
SEMIKRON DANFOSS
SIEMENS
SMA
SUNGROW Clean power for all
TRUMPF
Vincotech



Automotive

Over 50 companies

OEMs

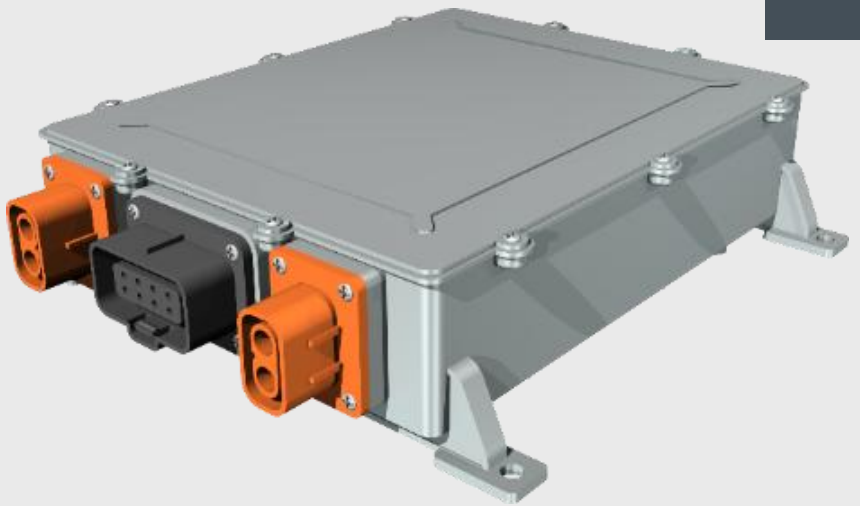
BMW
GEELY
LUCID
mazda
XPENG

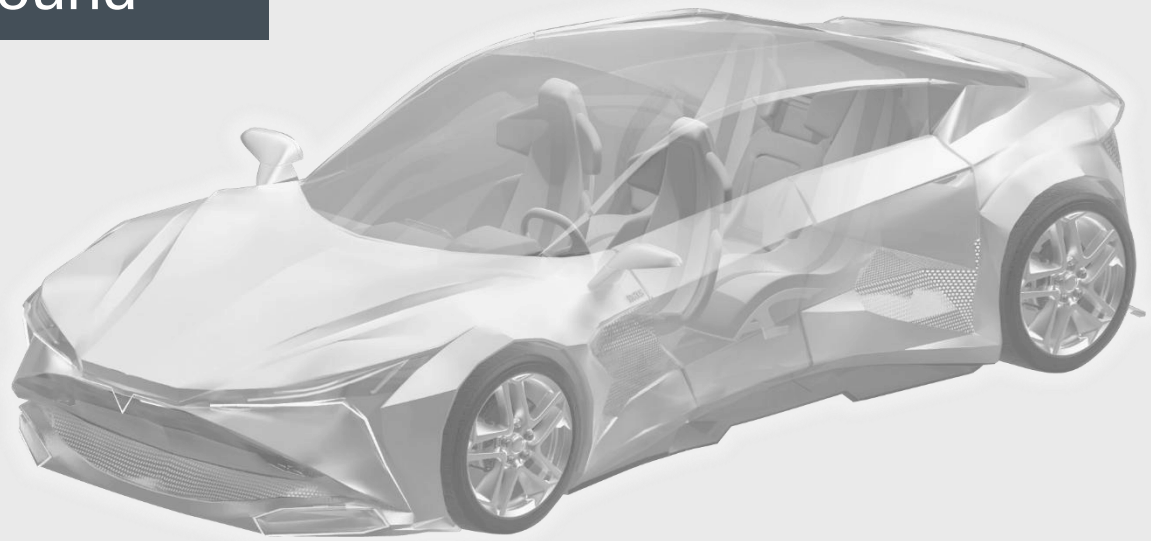
Tier1・2s

Astemo
BASiC Semiconductor
DELTA
HAIMOSIC 海姆希科
KOSTAL
LEADRIVE TECHNOLOGY
SCHAEFFLER
SEMIKRON DANFOSS
UAES

About SiC Modules for OBC and DC-DC

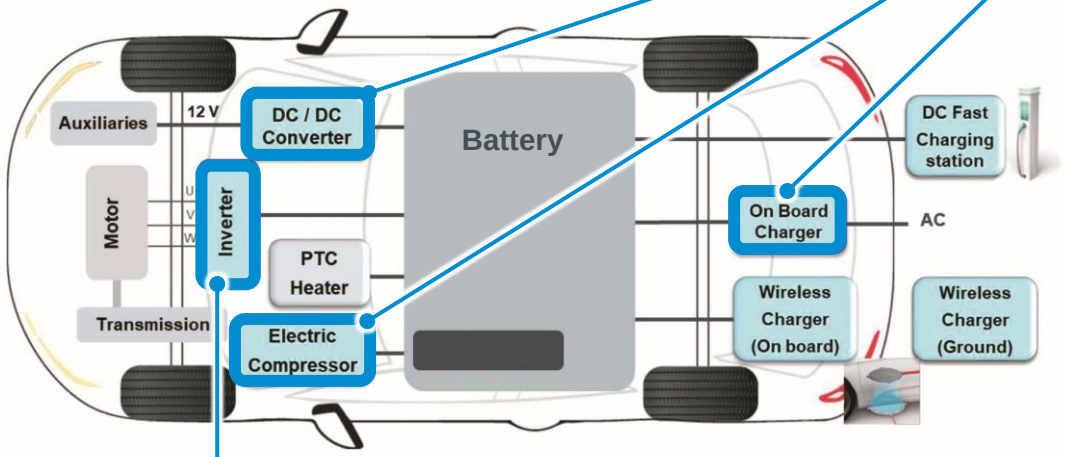
Development Background





About the HSDIP20 Market

Typical xEV Configuration



Announced June 2024: TRCDRIVE pack™.

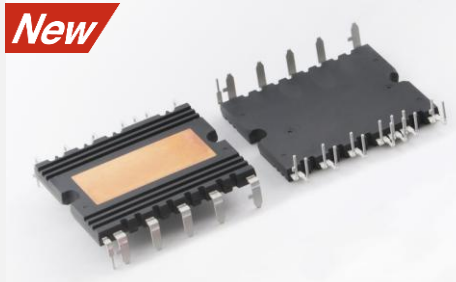
SiC molded type module for traction inverters

Target application: Traction inverters
=Output power: 100kW to 300kW approx.
Currents: 300A to 600A

ROHM's New TRCDRIVE pack™ with 2-in-1 SiC Molded Module: Significantly Reduces the Size of xEV Inverters

Announced in April 2025: HSDIP20

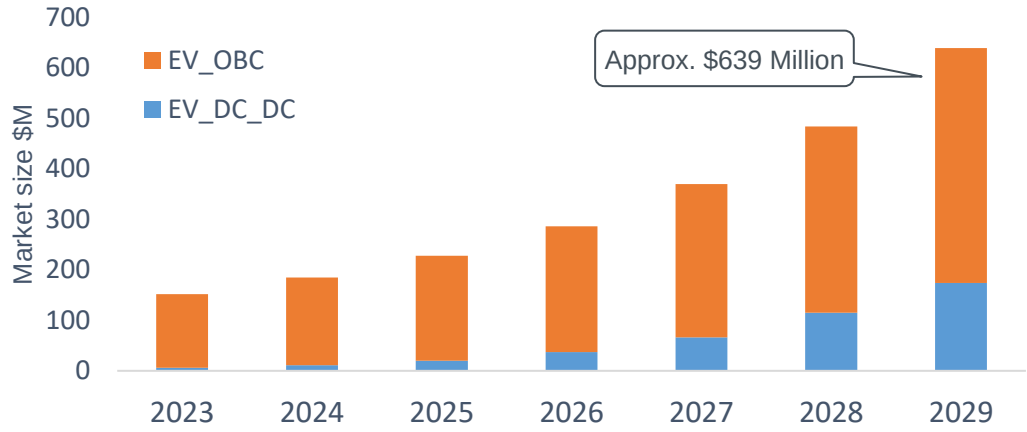
New



Target applications: DC-DC, OBC
=Output power: 3kW to 30kW
Currents: 100A or less

Market size for SiC Devices in OBC and DC-DC

Source: Power SiC 2024 report, Yole Group - Figures were created by ROHM.



HSDIP20 is suitable for integration into key xEV applications other than traction inverter.

Market demand for OBCs

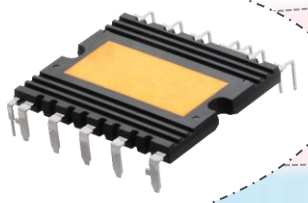
OBC Demand

Molded Type Modules Solution

~22kW

Regarding 22 kW class, modularization is essential.

New **HSDIP20**

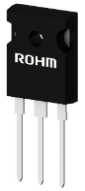


~11kW

Regarding the 11kW class, it is currently a volume zone. HSDIP20 has the advantage of miniaturization. (Power density improvement)

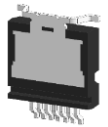
Discretes Solution

TO-247



TOLL*.

TSC*



TO-263-7L

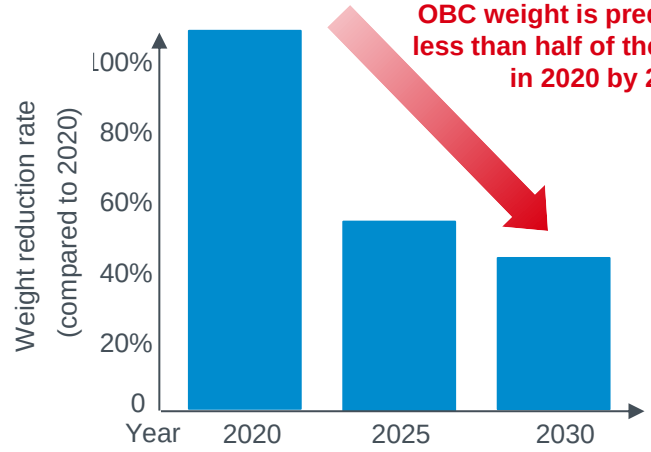
<7kW

Time.

*Under development

OBC weight trends

*ROHM study



Weight required for OBCs decreases gradually to the purpose of improving electricity costs, etc.

SiC devices for OBCs has been required both miniaturization and high output.

Overview of Small Molded Modules with Built-in SiC MOSFETs (HSDIP20)

BSTxxBxP4K01-VC (4-in-1) and BSTxxTxP4K01-VC (6-in-1) are molded type modules with 4 or 6 SiC MOSFETs built-in.
The basic circuits required in power conversion circuits for high-power applications are built into a small module package, contributing to the miniaturization of applications.

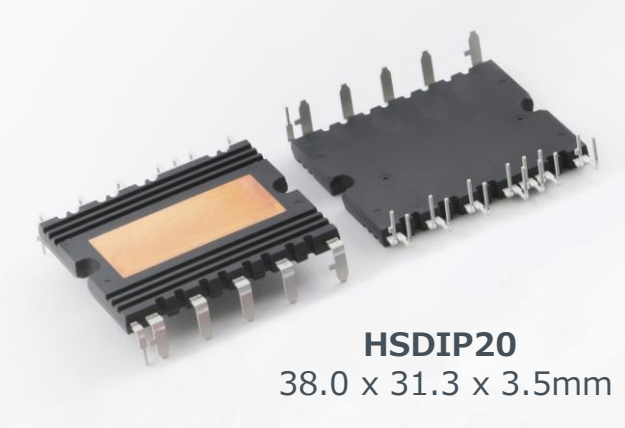
Features

1. High Heat Dissipation
2. High Power Density

Effect

3. Reduced Mounting Area

Compact size and high output by high power density!



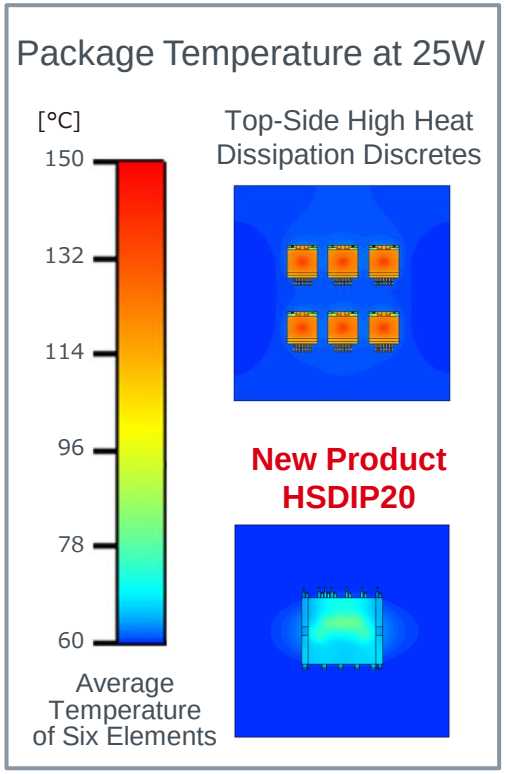
HSDIP20
38.0 x 31.3 x 3.5mm

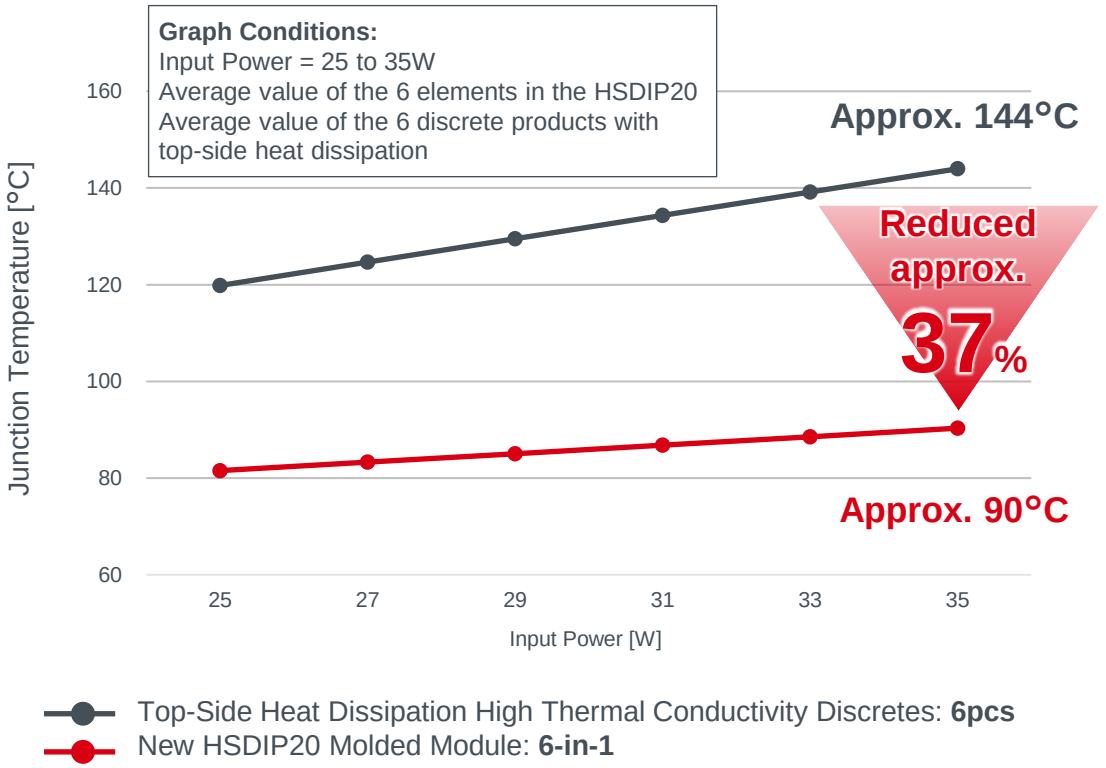
EcoSiC™ is a trademark or registered trademark of ROHM Co., Ltd.

EcoSiC™ is a brand of devices that utilize silicon carbide (SiC), which is attracting attention in the power device field for performance that surpasses silicon (Si). ROHM independently develops technologies essential for the evolution of SiC, from wafer fabrication and production processes to packaging, and quality control methods. At the same time, we have established an integrated production system throughout the manufacturing process, solidifying our position as a leading SiC supplier.

1. High Heat Dissipation: High Thermal Conductivity, Easy Insulation Design

Input Power vs Junction Temperature

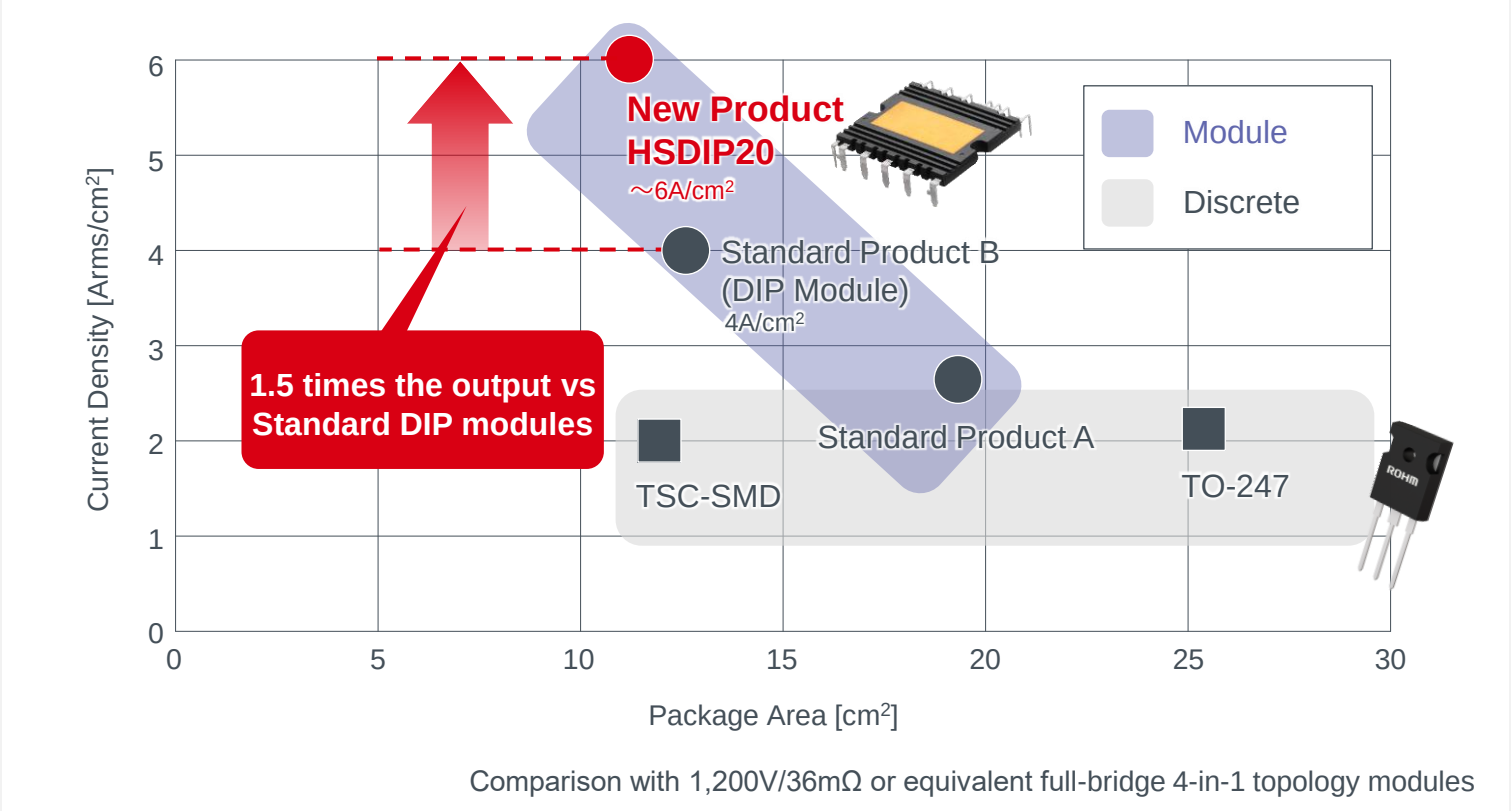




Superior thermal dissipation performance effectively suppresses heat generation within the package.

2. High power density: Delivers Higher Output than Comparable-Sized Power Modules

Current Density vs Standard Modules

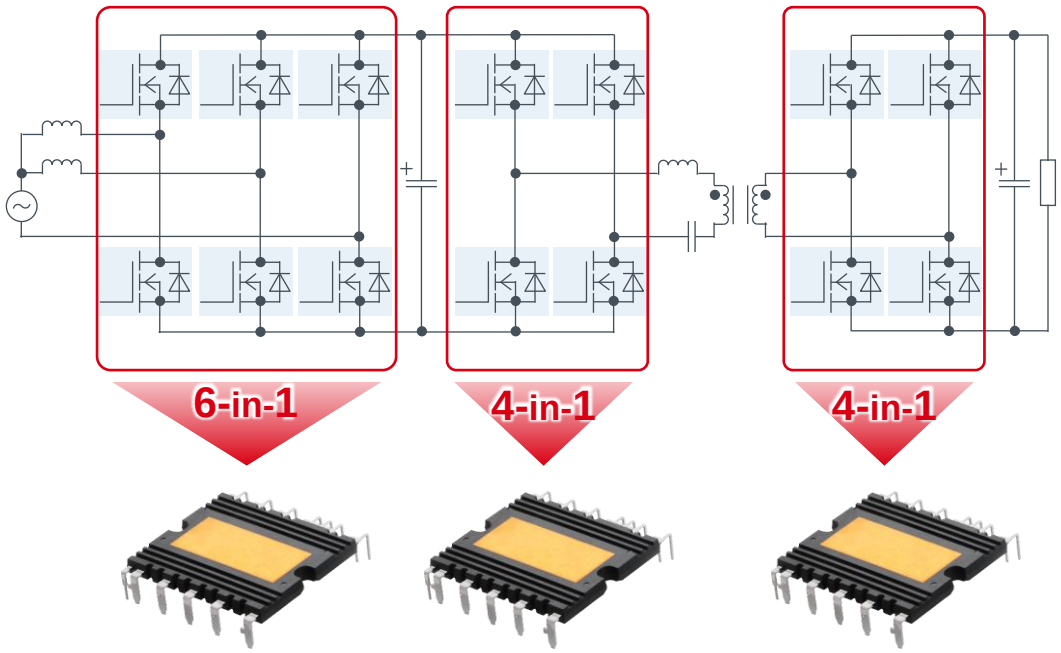


Comparison with 1,200V/36mΩ or equivalent full-bridge 4-in-1 topology modules

Combining a high thermal conductivity package with low ON-resistance SiC MOSFETs achieves 1.5 times the current density compared to standard DIP modules

3. Reduced Mounting Area: Miniaturizing PFC and LLC circuits

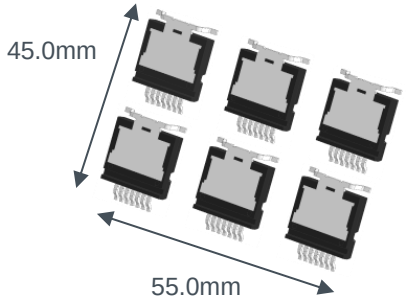
HSDIP20 Application Example
(Two-Phase Full-Bridge PFC + LLC Converter)



Streamline PFC and LLC circuits with a comprehensive lineup of 6-in-1 and 4-in-1 modules

Mounting Area Comparison in a PFC Circuit

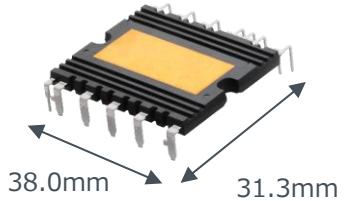
Top-Side Heat Dissipation Type Discretes



Approx. 24.75cm^2

Mounting area reduced approx. 52%

New Product HSDIP20

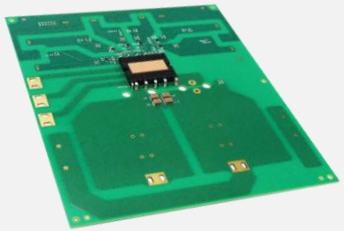


Approx. **11.89cm^2**

Facilitates the development of simple, compact power supply circuits

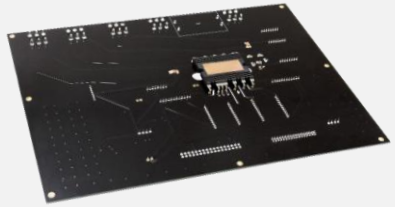
Evaluation Kits / Application Examples

Evaluation kit for double pulse testing



Features	・Specifically designed for double testing of HSDIP20 power modules ・Features ROHM's gate driver IC with active Miller clamp function ・Includes a layout pattern for the current-sensing shunt circuit
Specifications	Vdc = 400V to 800V Vcc7: 5V (gate driver supply voltage) Vcc1-6: 18V/0V (isolated supply voltage)

Evaluation kit for 3-phase full bridge



Features	・The 6-in-1 module enables 5kVA@50kHz operation with just a compact heat sink ・Modular design simplifies verification of circuit constants ・Built-in sensing functionality enables quick setup of motor drive systems
Specifications	Vdc = 400V Fc (Max) = 80kHz Output Power = 5kVA

Two ready-to-use evaluation kits available

For details, please contact a sales representative

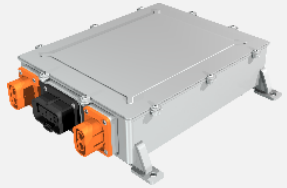
Automotive Systems

・Onboard chargers
・EV/PHEV DC-DC converters
・Electric compressors (e-Comp), etc.

Industrial Equipment

・EV charging stations
・PV inverters, energy storage systems (ESS)
・Servers supplies, motor drive, servos, and more

Onboard Chargers

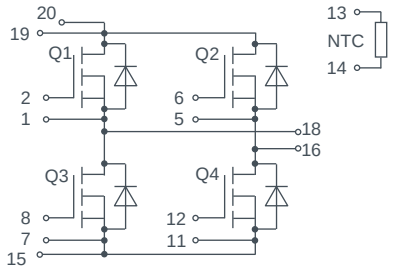
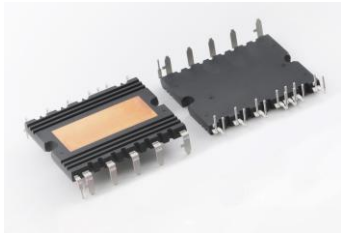
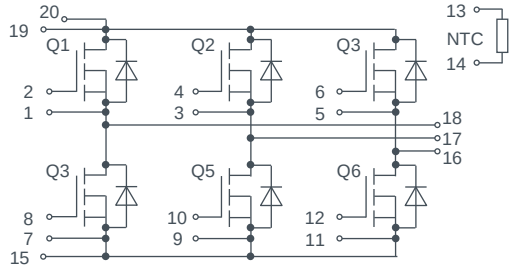


Electric Compressors

EV Charging Stations

Suitable for a wide range of applications - including automotive

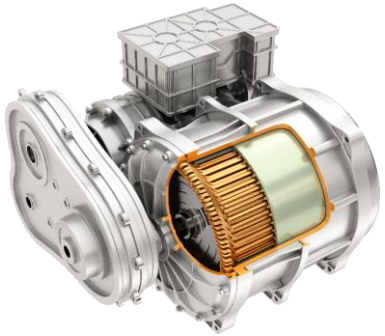
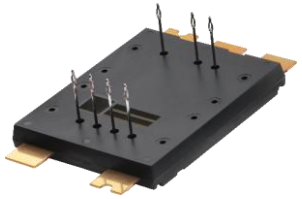
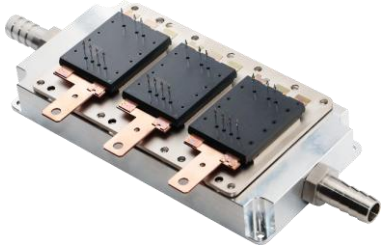
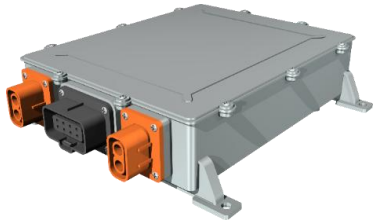
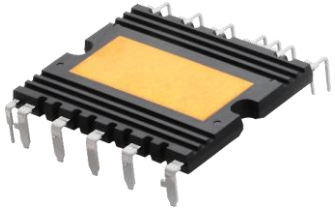
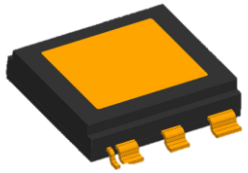
HSDIP20 Molded Module Package Lineup

Part No.	Topology	Circuit Diagram	Absolute Maximum Ratings (Tj= 25°C)			Automotive-Grade AQG-324	Package [mm]
			V_{DSS} [V]	$R_{DS(on)}$ [mΩ]	I_D*1 [A]		
New BST91B1P4K01	4-in-1	Full-Bridge Circuit 	750	13	90	YES	 HSDIP20 38.0×31.3×3.5
New BST47B1P4K01				26	47	YES	
New BST31B1P4K01				45	31	YES	
New BST70B2P4K01			1,200	18	70	YES	
New BST38B2P4K01				36	38	YES	
New BST25B2P4K01				62	25	YES	
New BST91T1P4K01	6-in-1	3-Phase Drive Circuit 	750	13	90	YES	
New BST47T1P4K01				26	47	YES	
New BST31T1P4K01				45	31	YES	
New BST70T2P4K01			1,200	18	70	YES	
New BST38T2P4K01				36	38	YES	
New BST25T2P4K01				62	25	YES	
New BST70M2P4K01*2				18 and 36	70 for 18mΩ*3 38 for 36mΩ*4	YES	

* 1: Tc=25°C V_{GS}=18V *2: Comprised of chips with different ON-resistance values *3: For terminals Q1 and Q4 *4 For terminals Q2, Q3, Q5, and Q6

Roadmap for SiC Molded Type Modules

*Under development

	2024	2025	2026	After 2027
For Traction Inverter	TRCDRIVE pack™ (2-in-1)	TRCDRIVE pack™ (6-in-1)*		
		 Modules mounted on a heat sink Further miniaturization		
For OBC		New HSDIP20	DOT-247*	Isolated 2-in-1 Surface Mount Package*	SiC IPM*
			 DIP type (2-in-1)	 Surface Mount Type (2-in-1)	 Built-in gate driver Further miniaturization

We are planning to develop SiC IPM with built-in gate drivers and 2-in-1 SiC modules

Electronics for the Future

© ROHM Co., Ltd.

Notes

- The contents specified herein are for the purpose of introducing ROHM products (hereinafter “Products”).
- When using any such Products, please be sure to refer to the specifications, which can be obtained from ROHM upon request.
- Great care was taken in ensuring the accuracy of the information specified in this document. However, should you incur any damage arising from any inaccuracy or misprint of such information, ROHM shall bear no responsibility for such damage.
- The technical information specified herein is intended only to show the typical functions of and examples of application circuits for the Products. ROHM does not grant the customer, either explicitly or implicitly, any license to use or exercise intellectual property or other rights held by ROHM and other parties.
- ROHM shall bear no responsibility whatsoever for any disputes arising from the use of such technical information. If intending to export or ship overseas any Product or technology specified herein that may be controlled under the Foreign Exchange and the Foreign Trade Law, it will be necessary to obtain a license or permit under the Law.
- The contents specified in this document are correct as of April 2025.