APD

Meet the Low-Carbon Life

Absolute Power Device

APD, based in Silicon Valley with headquarters in Taipei, focuses on semiconductor power chip R&D and design. The company is strategically positioned to meet global demands for hardware virtualization and electrification, particularly in areas like intelligent electric vehicles and energy-efficient solutions. APD has developed advanced power control switch modules to support these growing trends.

Learn More

Pioneering
Advancing Technology
Keeping Pace with the World

Responsibility
Leading the Way
Overcoming Challenges

Collaboration
Collaborative Development
Shaping the Future Together

Our Products

APD's silicon carbide semiconductors offer higher-switching-frequency, lower loss, easier cooling, greater temperature tolerance, and higher voltage capabilities, making them the optimal high-efficiency and energy-saving material for the power electronics drive control market.

SiC Schottky Diodes
Significantly lower switching loss

SiC MOSFETs
High speed switching with low On-resistance

IGBTs
High-efficiency power control with low losses

SiC Power Modules
Switching losses reduced by up to 75%

Products

Applications

APD's silicon carbide products are used in various automotive electronic components, offering high-efficiency and low-loss solutions.

Learn More

Support

APD provides comprehensive technical documentation and application guidance, including component principles and technical insights, to help engineers achieve optimal design and application results.

Learn More

Overview

Breakthrough Technology Combines High Performance With Low Losses

Silicon Carbide (SiC) semiconductors provide an innovative option for power electronic designers looking for improved system efficiency, smaller form factor and higher operating temperature in products covering industrial, automotive, medical, aviation and communication market segments. APD next-generation SiC MOSFETs and SiC Junction Barrier Schottky (JBS) are designed with higher repetitive Unclamped Inductive Switching (UIS) capability at rated on-resistance or current. Our SiC MOSFETs maintain high UIS capability at approximately 10–23 Joules Per Square Centimeter (J/cm2) and robust short circuit protection. Our SiC JBS are designed with balanced surge current, forward voltage, thermal resistance and thermal capacitance ratings at low reverse current for lower switching loss. In addition, our SiC MOSFET and SiC JBS die can be paired together for use in modules. SiC MOSFET and SiC JBS products from Our will be qualified to the AEC-Q100、101 、104 and AQG324 standard.

Industrial

Automotive

Aviation

Medical

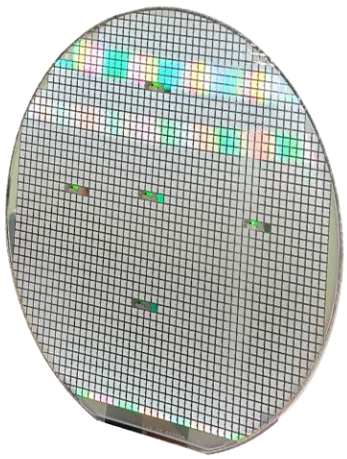
Communication

Energy efficient

SiC is the ideal technology for higher-switching-frequency, higher-efficiency and higher-power (>1200V) applications.

Target markets and applications include:

• Industrial	Motor drives、welding、UPS、SMPS、heating
• Automotive	Electric Vehicle (EV) battery chargers、On Board Chargers (OBC)、Traction inverters、Hybrid Electric Vehicle (HEV) powertrains、DC-DC Converters、Energy Recovery
• Smart energy	Photovoltaic (PV) inverters、wind turbines
• Medical	MRI power supply、X-ray power supply
• Aviation	Actuation、air conditioning、power distribution
• Communication	Inverters



Advanced R&D and Manufacturing

Design

- TCAD design and process simulators
- Mask-making and layout
- Finite Element Analysis (FEA) and Electrothermal simulation capabilities

Process

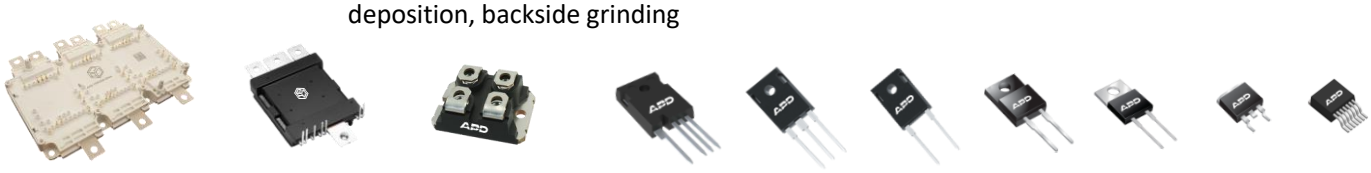
- Automotive quality internal fab and foundry
- Proprietary gate oxide process with exceptional reliability
- Specialized tools for SiC processes - implant, anneal, etch, furnaces, metal deposition, backside grinding

Analytical and Support

- Full FA capabilities in-house
- SEM/EDAX
- Thermal imaging
- Photo Emission Microscope system (Phemos 1000)

Reliability Testing

- AEC-Q100、101、104、AQG 324
- Full suite of tools and equipment for burn-ins and reliability screening
- Sonoscan and X-ray



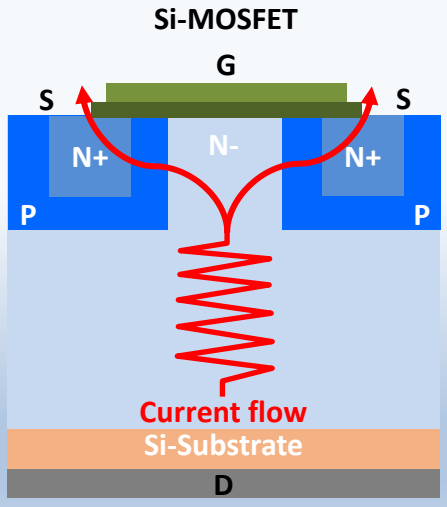
The demand for power is increasing on a global scale every year while fossil fuels continue to be depleted and global warming is growing at an alarming rate. Industrial equipment, high speed rail, electric vehicles, renewable energies, energy storage, home appliances... Power devices are a key component in power electronics products for contributing to the realization of a low-carbon society.

APD now offers SiC power devices featuring a number of characteristics, including: high breakdown voltage, low power consumption, and high-speed switching operation not provided by conventional silicon devices. In response to the growing demand for SiC products, APD has implemented the full-scale, mass production of next-generation SiC components.

SiC with superior characteristics

Features

- Higher voltages & currents
- Smaller cooling systems
- Low conduction loss
- Higher power density
- Reduced switching loss
- System miniaturization

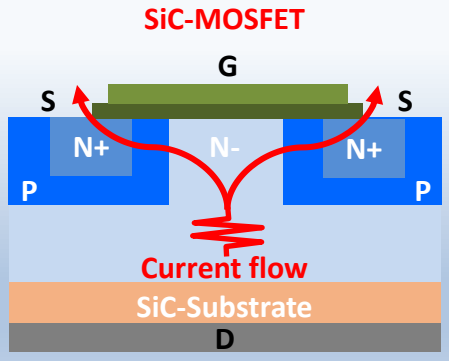


Breakdown Electric Field (MV/cm)
Si 0.3 / SiC **3.0**

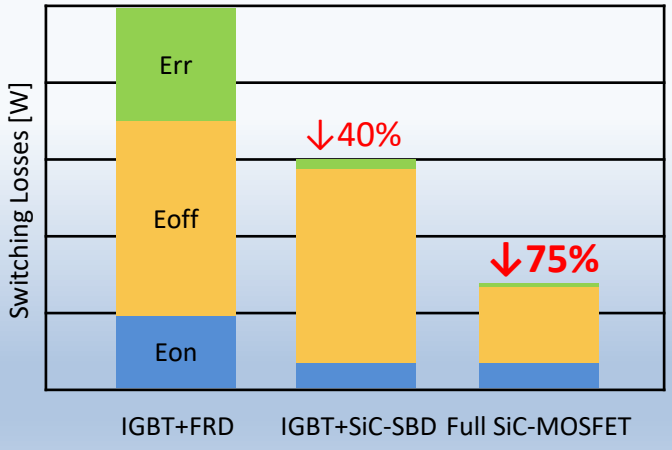
Bandgap (eV)
Si 1.1 / SiC **3.3**

Thermal Conductivity (W/cm ˚C)
Si 1.4 / SiC **4.0**

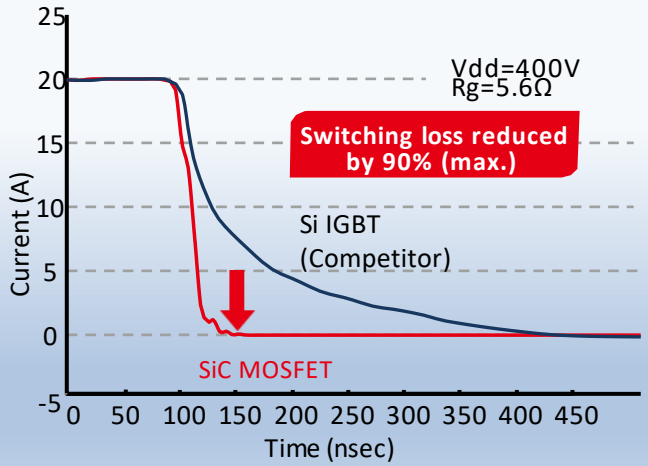
Reduction in electrical resistance ?



Condition : Vcc=600V, Io=225Arms (assuming a 110kW inverter), fc=15kHz, P.F=0.8, Modulation=1, Three-phase modulation, Tj=125˚C



Turn OFF Characteristics
(Compared with 1200V-Class Products)



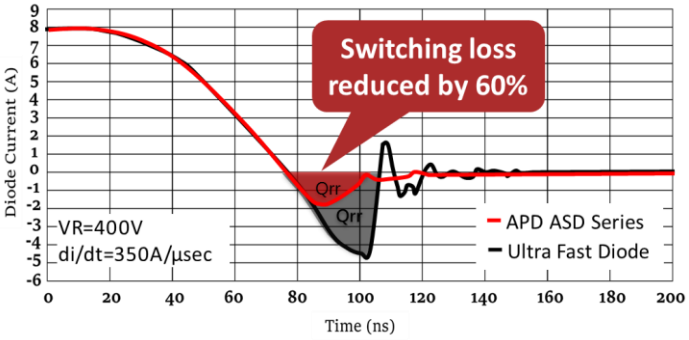
Power loss reduced

Adopting full SiC High dielectric field breakdown strength provides superior withstand voltage and greatly reduces switching losses.

SiC-JBS (Junction Barrier Schottky), Significantly lower switching loss.

Features

Silicon carbide adopts JBS (Junction Barrier Schottky) structure of high-speed component, making them ideal for PFC circuits and inverters. Ultra-small reverse recovery time (impossible to achieve with silicon FRDs) enables high-speed switching. This minimizes reverse recovery charge (Qrr), reducing switching loss considerably and contributes to end-product miniaturization.



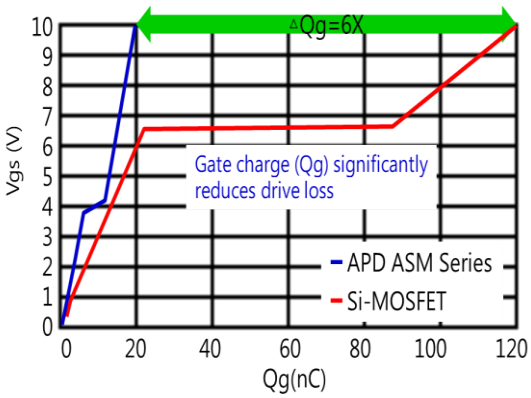
SOT-227B TO-247-2 ITO-220AC TO-220AC TO-263

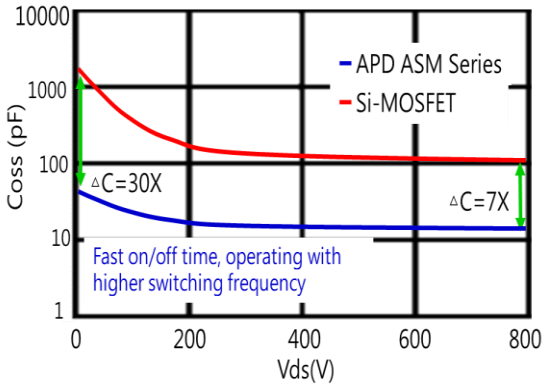
Application	APD Part Number	Specification		Package	Note
		Voltage (V)	Ampere (A)		
PFC Circuits	ASD06065AC	650	6	TO-220AC	
	ASD06065CTB	650	6	TO-263	
	ASD10065AC	650	10	TO-220AC	
	ASD10065CTB	650	10	TO-263	
	ASD20065PT2	650	20	TO-247-2	
	ASD40065PT	650	40	TO-247	
	ASD40065PT2	650	40	TO-247-2	
Inverter	ASD10120AC	1200	10	TO-220AC	
	ASD10120PT	1200	10	TO-247	
	ASD20120PT	1200	20	TO-247	
	ASD20120PT2	1200	20	TO-247-2	
	ASD30120PT2	1200	30	TO-247-2	
	ASD40120PT	1200	40	TO-247	
	ASD40120PT2	1200	40	TO-247-2	
	ASD50120PT2	1200	50	TO-247-2	
	ASD50120PT2	1200	50	TO-247-2	
	ASD100120-227	1200	100	SOT-227B	

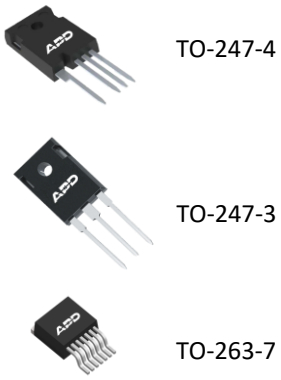
SiC-MOSFET, High speed switching with low On-resistance.

Features

Silicon carbide MOSFET enables simultaneous high speed switching with low ON-resistance – normally impossible with silicone-based products. Additional features include superior electric characteristics at high temperatures and significantly lower switching loss, allowing smaller peripheral components to be used.







Application	APD Part Number	Specification		Package	AEC-Q101 Qualified
		Voltage (V)	RDS(on) (mΩ)		
Motor Drive Super Charger Station PV Inverter PSU	ASM030N065PT	650	30	TO-247-3	
	ASM030N065PT4	650	30	TO-247-4	
	ASM045N065PT	650	45	TO-247-3	
	ASM045N065PT4	650	45	TO-247-4	
	ASM060N065PT	650	60	TO-247-3	
	ASM060N065PT4	650	60	TO-247-4	
	ASM012N075ACTB7	750	11.6	TO-263-7	✓
	ASM012N075APT	750	11.6	TO-247-3	✓
	ASM012N075APT4	750	11.6	TO-247-4	✓
	ASM054N075CTB7	750	54	TO-263-7	
	ASM054N075PT	750	54	TO-247-3	
	ASM054N075PT4	750	54	TO-247-4	

SiC-MOSFET, High speed switching with low On-resistance.

Features

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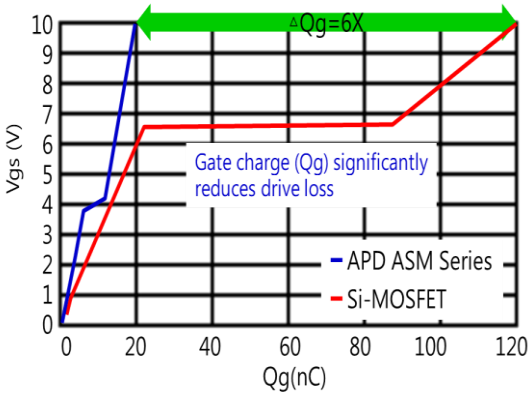
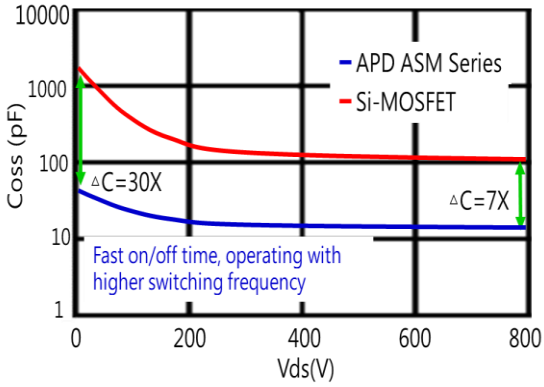
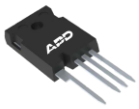
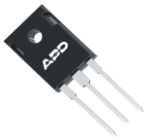





TO-247-4


TO-247-3


TO-263-7

Application	APD Part Number	Specification		Package	AEC-Q101 Qualified
		Voltage (V)	RDS(on) (mΩ)		
SMPS DC-DC Converter Industrial Motor Control Super Charger Station OBC PV Inverter	ASM015N120APT4	1200	15	TO-247-4	✓
	ASM020N120PT4	1200	20	TO-247-4	
	ASM028N120PT4	1200	28	TO-247-4	
	ASM030N120PT4	1200	30	TO-247-4	
	ASM039N120PT4	1200	39	TO-247-4	
	ASM040N120CTB7	1200	40	TO-263-7	
	ASM040N120PT4	1200	40	TO-247-4	
	ASM056N120CTB7	1200	56	TO-263-7	
	ASM078N120APT4	1200	78	TO-247-4	✓
	ASM078N120APT	1200	78	TO-247-3	✓
	ASM078N120ACTB7	1200	78	TO-263-7	✓
	ASM078N120APT4	1200	78	TO-247-4	✓
	ASM180N120ACTB7	1200	180	TO-263-7	✓
	ASM180N120APT4	1200	180	TO-247-4	✓
Industrial Motor Control Inverter	ASM560N170PT	1700	560	TO-247-3	
	ASM560N170PT4	1700	560	TO-247-4	
	ASM560N170CTB7	1700	560	TO-263-7	
	ASM040N170APT4	1700	40	TO-247-4	✓

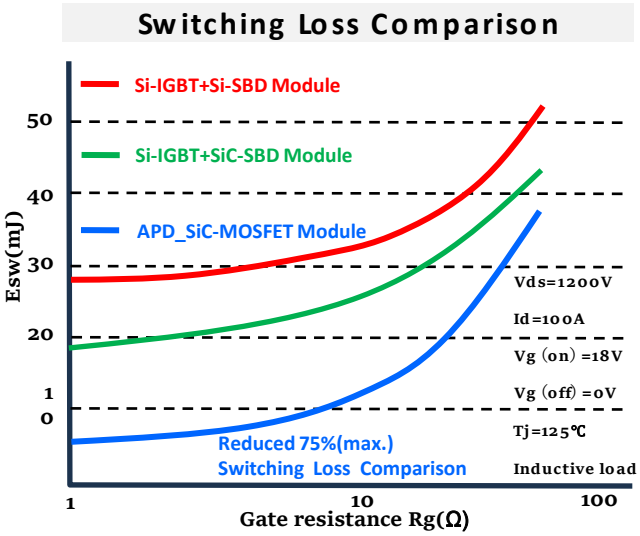
Full SiC Power Module, Switching loss reduced by 75% (max.).

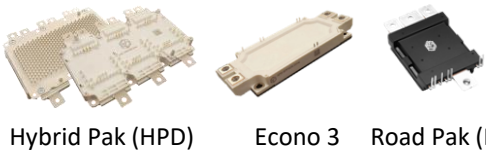
Powerful and efficient traction inverters for EV

The traction inverter is an essential component for electric vehicle drivetrains, as it controls the motor and determines driving behavior. It minimizes switching losses, maximizes thermal efficiency, and enables regenerative braking to recharge the battery. APD provides a complete system solution for traction inverter design to achieve high efficiency, optimized performance, and fast time to market.

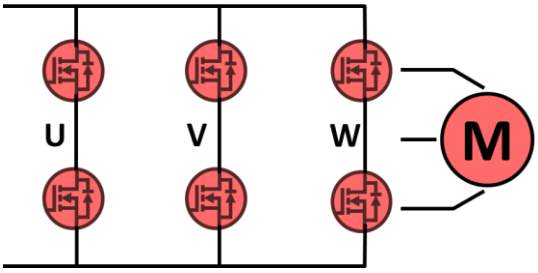
Features

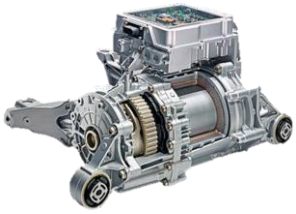
■ Contributes to reducing size/weight of industrial-use inverters with the mounting area reduced by approx. 60%
■ Power loss reduced approx. 75% compared to the conventional product.
■ Low-inductance package adopted to deliver full SiC performance.
■ Contributes to realizing smaller/lighter inverter equipment by significantly reducing the package size and realizing a mounting area approx. 60% smaller compared to the conventional product.





Hybrid Pak (HPD) Econo 3 Road Pak (M1) T Pak SOT 227





Application	APD Part Number	Specification		Package	AQG324 Qualified
		Voltage (V)	RDS(on) (mΩ)		
Traction Inverter Industrial Automation and Testing Industrial Motor Driver High Voltage Direct Current (HVDC) Transmission	ASPM001N120ARDP	1200	1.1	M1	✓
	ASPM002N120ARDP	1200	2	M1	✓
	ASPM002N120AED3	1200	2	Econo 3	✓
	ASPM003N120AED3	1200	2.5	Econo 3	
	ASPM002N120AHBP	1200	2	HPD	✓
	ASPM003N120HBP	1200	2.5	HPD	
	ASM007N120ATSP	1200	7	T-PAK	✓
	ASM010N120TSP	1200	10	T-PAK	
	ASM007N120-A227	1200	7	SOT-227	✓
	ASM010N120-A227	1200	10	SOT-227	
	ASM010N170-A227	1700	20	SOT-227	✓

Notes

Important Notice

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