



The Power To  
**MAKE IT REAL**

POWER PRODUCTS CATALOG

# Industry-Leading Silicon Carbide Power Products

# THE POWER TO MAKE IT REAL

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Silicon carbide provides unprecedented advantages of power density and efficiency, enabling a new set of high-power applications to create a more sustainable, electrified future.

At Wolfspeed, we pioneered the first commercial silicon carbide wafers in 1991. In 2011, we got one step closer to an electrified future, when we introduced the industry's first silicon carbide MOSFETs. Today, our quest for better is rooted in our rich legacy of SiC invention and driven forward by our scientists' passion to harness half the power of the sun, to create one of the toughest materials on Earth.

Whether you are a world-leading automotive original manufacturer (OEM), driving the adoption of electric

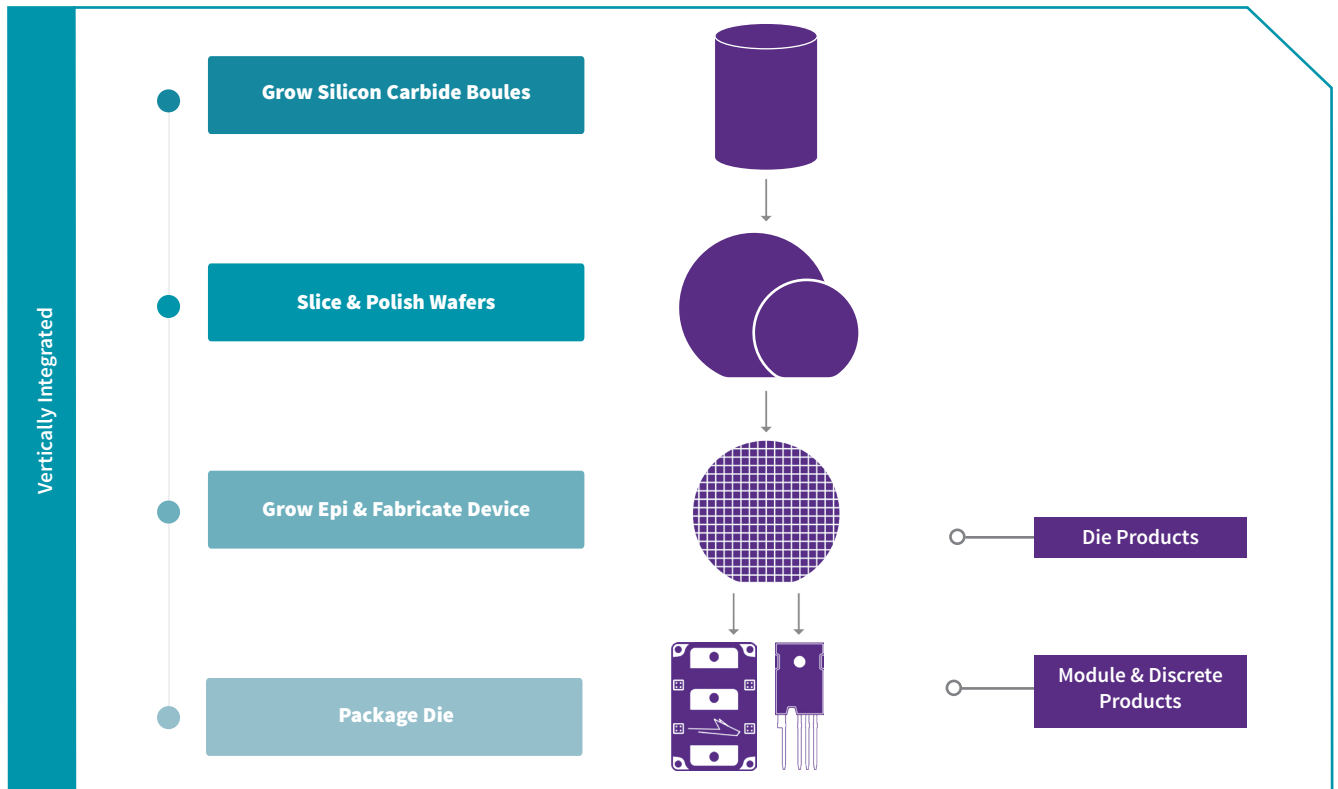
cars, or a small utility company, providing accessible energy to local municipalities, we are here to provide you silicon carbide to power the world's most disruptive innovations.

We recognize that adopting new technology comes with challenges. That's why we're dedicated to making this transition easier for you. From inception to production, we design our products with the most critical design challenges in mind. Our reference designs, SpeedFit™ design simulator, and evaluation tools are created to facilitate your design process and get you to production faster.

So bring us your what ifs. Those never-been-done-before. We will bring you the power to make it real.



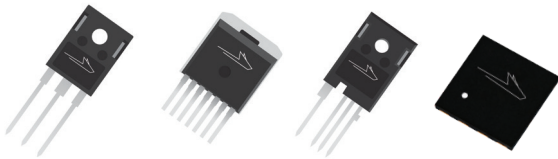
# INNOVATING EVERY STEP OF THE WAY



Pages 4-12

## POWER MODULES

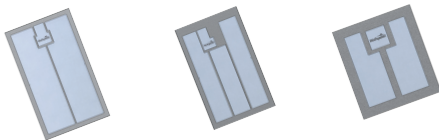
Power modules in industry-standard and optimized packaging for high-power applications ranging from 15 kW to 500+ kW.



Pages 13-22

## DISCRETE POWER DEVICES

MOSFET and Schottky diode discrete devices for greater design flexibility in applications ranging from 1 kW to 60 kW.



Pages 23-25

## POWER BARE DIE PRODUCTS

MOSFET and Schottky diode devices in die form for customers with internal semiconductor packaging process.



Pages 26-29

## DESIGN AND EVALUATION TOOLS

Reference designs, design and evaluation tool to ease your design process and get you to market faster.

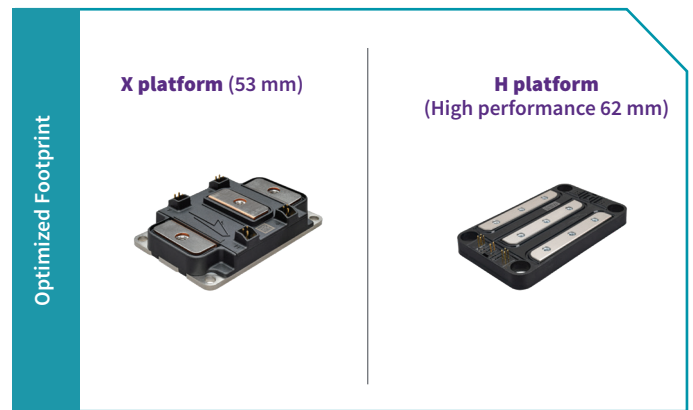
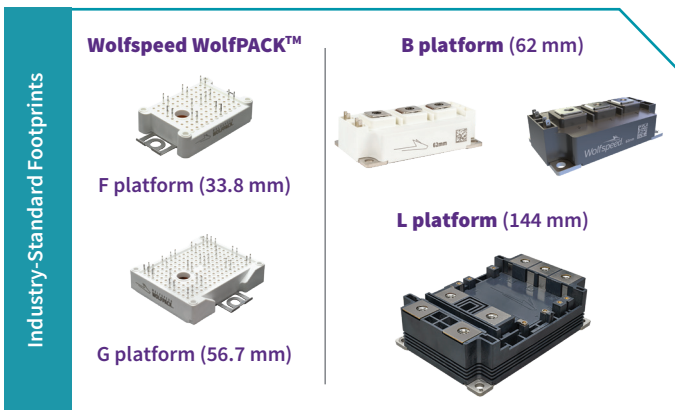
# MAXIMIZE SYSTEM POWER DENSITY WHILE SIMPLIFYING DESIGN LAYOUT AND ASSEMBLY

As the need for more power continues to increase, so does the need to design smaller systems. SiC power modules help reduce system's size and volume to maximize power density.

We offer a portfolio of power modules in industry-standard and optimized footprints to bring the benefits

of SiC to a wide range of industrial, renewable energy and automotive applications with power requirements from 15 kW to over 500 kW.

Our packaging technology with the Aluminum Nitride (AlN) Substrate reduces thermal resistance and lowers junction temperature for given losses to further improve system performance.



## INDUSTRY-STANDARD FOOTPRINTS

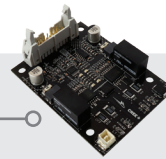
Well-established footprints / packages that have been internally optimized for Silicon Carbide and provide a straight-forward drop-in replacement at the package level for customers using these platforms with either Si or Silicon Carbide devices.

## OPTIMIZED FOOTPRINTS

Uniquely developed by Wolfspeed to offer new capability designed specifically for Silicon Carbide.

## MODULE GATE DRIVER BOARDS

CGD1200HBP-BM2  
CGD1200HBP-BM3



CGD1700HB2P-XM3



	SKU	Package	Designed By	Working Voltage	Gate Driver	Output Channels
COMPANION GATE DRIVERS	CGD12HBXMP	X Platform	Wolfspeed	1000 V	Analog Devices® ADuM4135	2
	CGD1200HB2P-BM2	B Platform	Wolfspeed	1000 V	Analog Devices ADuM4135	2
	CGD1200HB2P-BM3	B Platform	Wolfspeed	1000 V	Analog Devices ADuM4135	2
	UCC5880QEVMM-057	X Platform	Partner	1200 V	Texas Instruments® UCC5880Q1	2
	UCC5880INVERTEREVM	X Platform	Partner	1200 V	Texas Instruments® UCC5880-Q1	2
	CGD1700HB2M-UNA	F Platform, G Platform	Wolfspeed	1500 V	Texas Instruments® UCC21710	2
	FRDMGD3160XM3EVM	X Platform	Partner	1500 V	NXP® GD3160	2
	EVAL-ADUM4146WHB1Z	F Platform, G Platform	Partner	1500 V	Analog Devices ADuM4146	2
	Si823H-AxWA-KIT	F Platform, G Platform	Partner	1500 V	Skyworks® Si823Hx	2
	CGD1700HB3P-HM3	H Platform	Wolfspeed	1500 V	IXDD614YY	2
	ACPL-355JC	F Platform, G Platform	Partner	1500 V	Broadcom®, ACPL-355JC	2
	CGD1700HB2P-BM3	B Platform	Wolfspeed	1500 V	Analog Devices ADuM4146	2
	CGD1700HB2P-XM3	X Platform	Wolfspeed	1500 V	Analog Devices ADuM4146	2

# WOLFSPEED® MODULES

	Part Number	Blocking Voltage (V)	Nominal Current (A)	$R_{DS(ON)}$ (m $\Omega$ ) at 25°C	Description
G PLATFORM std. 56.7 mm	CCB016M12GM3T	1200	50	16	Six-Pack, Al <sub>2</sub> O <sub>3</sub> Substrate, Pre-Applied TIM
	CCB016M12GM3	1200	50	16	Six-Pack, Al <sub>2</sub> O <sub>3</sub> Substrate
	CBB011M12GM4*	1200	107	11	Full-Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate, Pre-Applied TIM
	CBB011M12GM4*	1200	107	11	Full-Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate
	CHB011M12GM4T*	1200	102	11	T-Type, Al <sub>2</sub> O <sub>3</sub> Substrate, Pre-Applied TIM
	CHB011M12GM4*	1200	102	11	T-Type, Al <sub>2</sub> O <sub>3</sub> Substrate
	CAB011A12GM3T	1200	141	11	Half-Bridge, AlN Substrate, Pre-Applied TIM
	CAB011A12GM3	1200	141	11	Half-Bridge, AlN Substrate
	CAB008M12GM3T	1200	146	8	Half-Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate, Pre-Applied TIM
	CAB008M12GM3	1200	146	8	Half-Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate
	CAB008A12GM3T	1200	194	8	Half-Bridge, AlN Substrate, Pre-Applied TIM
	CAB008A12GM3	1200	194	8	Half-Bridge, AlN Substrate
	CAB006A12GM3T	1200	200	6	Half-Bridge, AlN Substrate, Pre-Applied TIM
	CAB006A12GM3	1200	200	6	Half-Bridge, AlN Substrate
	CAB006M12GM3T	1200	200	6	Half-Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate, Pre-Applied TIM
	CAB006M12GM3	1200	200	6	Half-Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate
	CAB004M12GM4T*	1200	200	4	Half-Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate, Pre-Applied TIM
	CAB004M12GM4*	1200	200	4	Half-Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate
	CAB7R5A23GM4*	2300	180	7.5	Half-Bridge, AlN Substrate, Pre-Applied TIM
	CAB7R5A23GM4*	2300	180	7.5	Half-Bridge, AlN Substrate
CAB6R0A23GM4*	2300	200	6	Half-Bridge, AlN Substrate, Pre-Applied TIM	
CAB6R0A23GM4*	2300	200	6	Half-Bridge, AlN Substrate	
CAB5R0A23GM4*	2300	200	5	Half-Bridge, AlN Substrate, Pre-Applied TIM	
CAB5R0A23GM4*	2300	200	5	Half-Bridge, AlN Substrate	

F PLATFORM std. 33.8 mm	CBB032M12FM3T	1200	39	32	Full Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate, Pre-Applied TIM
	CBB032M12FM3	1200	39	32	Full Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate
	CCB032M12FM3T	1200	30	32	Six-Pack, Al <sub>2</sub> O <sub>3</sub> Substrate, Pre-Applied TIM
	CCB032M12FM3	1200	30	32	Six-Pack, Al <sub>2</sub> O <sub>3</sub> Substrate
	CBB021M12FM3T	1200	50	21	Full Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate, Pre-Applied TIM
	CBB021M12FM3	1200	50	21	Full Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate
	CCB021M12FM3T	1200	30	21	Six-Pack, Al <sub>2</sub> O <sub>3</sub> Substrate, Pre-Applied TIM
	CCB021M12FM3	1200	30	21	Six-Pack, Al <sub>2</sub> O <sub>3</sub> Substrate
	CBB017M12FM4T*	1200	60	17	Full Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate, Pre-Applied TIM
	CBB017M12FM4*	1200	60	17	Full Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate
	CAB016M12FM3T	1200	78	16	Half-Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate, Pre-Applied TIM
	CAB016M12FM3	1200	78	16	Half-Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate
	CAB011M12FM3T	1200	105	11	Half-Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate, Pre-Applied TIM
	CAB011M12FM3	1200	105	11	Half-Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate
	CAB008M12FM4T*	1200	105	8	Half-Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate, Pre-Applied TIM
	CAB008M12FM4*	1200	105	8	Half-Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate

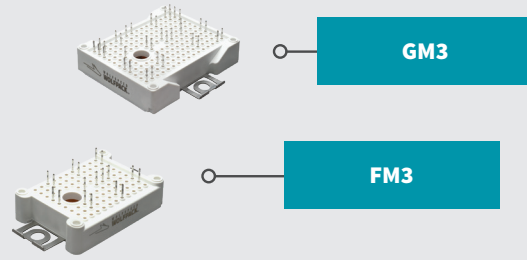
	Part Number	Blocking Voltage (V)	Nominal Current (A)	$R_{DS(ON)}$ (m $\Omega$ ) at 25°C	Description
B PLATFORM standard 62 mm	CAS175M12BM3	1200	175	8	Half-Bridge, C3M™ MOSFETs + Schottky Diodes
	HAS175M12BM3	1200	175	8	Half-Bridge, Harsh Environment, THB-80 Qualified, C3M MOSFETs + Schottky Diodes
	WAS175M12BM3	1200	175	8	Half-Bridge, THB-80 Qualified, C3M MOSFETs + Schottky Diodes
	CAS350M12BM3	1200	350	4	Half-Bridge, C3M MOSFETs + Schottky Diodes
	HAS350M12BM3	1200	350	4	Half-Bridge, Harsh Environment, THB-80 Qualified, C3M MOSFETs + Schottky Diodes
	WAS350M12BM3	1200	350	4	Half-Bridge, THB-80 Qualified, C3M MOSFETs + Schottky Diodes
	HAS530M12BM3	1200	530	2.7	Half-Bridge, Harsh Environment, THB-80 Qualified, C3M MOSFETs + Schottky Diodes
	CAB530M12BM3	1200	530	2.7	Half-Bridge, C3M MOSFETs
	CAS530M12BM3	1200	530	2.7	Half-Bridge, C3M MOSFETs + Schottky Diodes
	WAS530M12BM3	1200	530	2.7	Half-Bridge, THB-80 Qualified, C3M MOSFETs + Schottky Diodes
	CAS310M17BM3	1700	310	5	Half-Bridge, C3M MOSFETs + Schottky Diodes
	HAS310M17BM3	1700	310	5	Half-Bridge, Harsh Environment, THB-80 Qualified, C3M MOSFETs + Schottky Diodes
	WAS310M17BM3	1700	310	5	Half-Bridge, THB-80 Qualified, C3M MOSFETs + Schottky Diodes
	L PLATFORM standard 144 mm	CAB600M33LM3	3300	770	2.7
X PLATFORM optimized 53 mm	CAB400M12XM3	1200	400	4	Half-Bridge, C3M MOSFETs
	CAB425M12XM3	1200	425	3.2	Half-Bridge, C3M MOSFETs
	CAB450M12XM3	1200	450	2.6	Half-Bridge, C3M Conduction-Optimized MOSFETs
	EAB450M12XM3	1200	450	2.6	Automotive grade, Half-Bridge, C3M Conduction-Optimized MOSFETs
	CAB320M17XM3	1700	320	4	Half-Bridge, C3M MOSFETs
H PLATFORM optimized 62 mm	CAS480M12HM3	1200	480	2.29	Half-Bridge, C3M MOSFETs + Schottky Diodes
	CAR600M12HN6	1200	600	N/A	Half-Bridge Rectifier, Gen 6 Schottky Diodes
	CAB760M12HM3	1200	765	1.33	Half-Bridge, C3M MOSFETs
	CAB760M12HM3R	1200	760	1.33	Half-Bridge Right GK for Paralleling, C3M MOSFETs
	CAS380M17HM3	1700	380	3.3	Half-Bridge, C3M MOSFETs + Schottky Diodes
	CAB500M17HM3	1700	500	2.5	Half-Bridge, C3M MOSFETs
	CAR600M17HN6	1700	600	N/A	Half-Bridge Rectifier, Gen 6 Schottky Diodes
	CAB650M17HM3	1700	650	1.67	Half-Bridge, C3M MOSFETs
D PLATFORM Optimized 40.8 mm	CAB003M09DM3	900	350	2.5	Half-Bridge, C3M MOSFETs
	CAB3R5M12DM4*	1200	350	3.5	Half-Bridge, C3M MOSFETs

\*Coming Soon

# Wolfspeed WolfPACK™ F & G MODULE PLATFORMS

**DELIVERING THE INDUSTRY'S HIGHEST POWER DENSITY IN ITS CLASS FOR UNSURPASSED EFFICIENCY**

Wolfspeed WolfPACK™ Silicon Carbide Power Modules enable multiple configurations across power levels in multiple applications. The new GM3 Aluminum Nitride Substrate dramatically reduces thermal resistance, lowers junction temperature for given loss, enhances power cycling lifetime for given losses, and enables higher utilization of Silicon Carbide performance.



**Module Size:**

F platform | 62.8 mm x 33.8 mm  
G platform | 62.8 mm x 56.7 mm

**Topology:**

F platform | six-pack / half-bridge / full-bridge  
G platform | half-bridge



**FEATURES**

- Leading Silicon Carbide MOSFET Technology in an Industry Standard Form Factor
- Highest Current Rated Topologies Commercially Available in Class
- Built in NTC
- Press Fit Connections
- High performance Aluminum Nitride (AlN) Substrate
- Available with Pre-Applied TIM



**BENEFITS**

- Maximum Power Density In Class
- Ease Of Layout and Assembly
- System Scalability and Reliability
- End To End Support - Simulation Through Reference Hardware
- Simpler Cooling Systems and Smaller Systems



**APPLICATIONS**

- EV Fast Charging
- UPS
- Induction Heating and Welding Industrial
- Motor Drives
- Industrial Power Supply
- Solar
- Renewable Energy Storage

	Part Number	Blocking Voltage (V)	Nominal Current (A)	R <sub>DS(ON)</sub> (mΩ) at 25°C	Description
G PLATFORM std. 56.7 mm	CCB016M12GM3T	1200	50	16	Six-Pack, Al <sub>2</sub> O <sub>3</sub> Substrate, Pre-Applied TIM
	CCB016M12GM3	1200	50	16	Six-Pack, Al <sub>2</sub> O <sub>3</sub> Substrate
	CBB011M12GM4*	1200	107	11	Full-Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate, Pre-Applied TIM
	CBB011M12GM4*	1200	107	11	Full-Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate
	CHB011M12GM4T*	1200	102	11	T-Type, Al <sub>2</sub> O <sub>3</sub> Substrate, Pre-Applied TIM
	CHB011M12GM4*	1200	102	11	T-Type, Al <sub>2</sub> O <sub>3</sub> Substrate
	CAB011A12GM3T	1200	141	11	Half-Bridge, AlN Substrate, Pre-Applied TIM
	CAB011A12GM3	1200	141	11	Half-Bridge, AlN Substrate
	CAB008M12GM3T	1200	146	8	Half-Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate, Pre-Applied TIM
	CAB008M12GM3	1200	146	8	Half-Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate
	CAB008A12GM3T	1200	194	8	Half-Bridge, AlN Substrate, Pre-Applied TIM
	CAB008A12GM3	1200	194	8	Half-Bridge, AlN Substrate
	CAB006A12GM3T	1200	200	6	Half-Bridge, AlN Substrate, Pre-Applied TIM
	CAB006A12GM3	1200	200	6	Half-Bridge, AlN Substrate

	Part Number	Blocking Voltage (V)	Nominal Current (A)	$R_{DS(ON)}$ (m $\Omega$ ) at 25°C	Description
G PLATFORM std. 56.7 mm	CAB006M12GM3T	1200	200	6	Half-Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate, Pre-Applied TIM
	CAB006M12GM3	1200	200	6	Half-Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate
	CAB004M12GM4T*	1200	200	4	Half-Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate, Pre-Applied TIM
	CAB004M12GM4*	1200	200	4	Half-Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate
	CAB7R5A23GM4*	2300	180	7.5	Half-Bridge, AlN Substrate, Pre-Applied TIM
	CAB7R5A23GM4*	2300	180	7.5	Half-Bridge, AlN Substrate
	CAB6R0A23GM4*	2300	200	6	Half-Bridge, AlN Substrate, Pre-Applied TIM
	CAB6R0A23GM4*	2300	200	6	Half-Bridge, AlN Substrate
	CAB5R0A23GM4*	2300	200	5	Half-Bridge, AlN Substrate, Pre-Applied TIM
	CAB5R0A23GM4*	2300	200	5	Half-Bridge, AlN Substrate

F PLATFORM std. 33.8 mm	CBB032M12FM3T	1200	39	32	Full Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate, Pre-Applied TIM
	CBB032M12FM3	1200	39	32	Full Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate
	CCB032M12FM3T	1200	30	32	Six-Pack, Al <sub>2</sub> O <sub>3</sub> Substrate, Pre-Applied TIM
	CCB032M12FM3	1200	30	32	Six-Pack, Al <sub>2</sub> O <sub>3</sub> Substrate
	CBB021M12FM3T	1200	50	21	Full Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate, Pre-Applied TIM
	CBB021M12FM3	1200	50	21	Full Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate
	CBB017M12FM4T*	1200	60	17	Full Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate, Pre-Applied TIM
	CBB017M12FM4*	1200	60	17	Full Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate
	CCB021M12FM3T	1200	30	21	Six-Pack, Al <sub>2</sub> O <sub>3</sub> Substrate, Pre-Applied TIM
	CCB021M12FM3	1200	30	21	Six-Pack, Al <sub>2</sub> O <sub>3</sub> Substrate
	CAB016M12FM3T	1200	78	16	Half-Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate, Pre-Applied TIM
	CAB016M12FM3	1200	78	16	Half-Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate
	CAB011M12FM3T	1200	105	11	Half-Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate, Pre-Applied TIM
	CAB011M12FM3	1200	105	11	Half-Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate
	CAB008M12FM4T*	1200	105	8	Half-Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate, Pre-Applied TIM
	CAB008M12FM4*	1200	105	8	Half-Bridge, Al <sub>2</sub> O <sub>3</sub> Substrate

\*Coming Soon



# B MODULE PLATFORM

## WOLFSPEED'S 62 MM HALF-BRIDGE SILICON CARBIDE POWER MODULES SUPPORT **RAPID SYSTEM DEVELOPMENT**

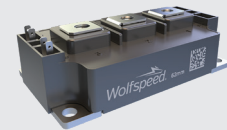
Wolfspeed's 62mm power module platform provides the system benefits of Silicon Carbide while maintaining the robust, industry-standard 62 mm module package. The internal design of Wolfspeed's 62 mm BM package enables high speed Silicon Carbide switching benefits, due to the low-inductance layout. Choose from silicon nitride ceramic for sustained maximum junction temperature operation, or aluminum nitride ceramic for reduced thermal resistance with robust CTE matching. Wolfspeed power modules are backed by industry leading Silicon Carbide technology and a broad portfolio of current and voltage ratings available to fit diverse industrial application requirements.

**MODULE SIZE:**  
106 x 62 x 30 (mm)

**TOPOLOGY:**  
Half-Bridge

**SUPPORTING GATE DRIVER:**  
CGD1200HB2P-BM2 for 1200 V BM2 modules  
CGD1700HB2P-BM2 for 1700 V BM2 modules  
CGD1200HB2P-BM3 for 1200 V BM3 modules  
CGD1700HB2P-BM3 for 1700 V BM3 modules

**SUPPORTING EVALUATION KIT:**  
KIT-CRD-CIL12N-BM  
KIT-CRD-CIL17N-BM



### FEATURES

Copper Baseplate, Silicon Nitride and Aluminum Nitride Ceramics

Low Inductance Design (10 – 11nH)



### BENEFITS

Improved Thermal Conductivity

Faster Time to Market

Reduced Cooling & System Costs

Low Power Losses & Maximum Voltage Utilization



### APPLICATIONS

Railway Technology

EV Fast Charging

On-Board Charging

Industrial Automation & Testing

Renewable Energy

	Part Number	Blocking Voltage (V)	Nominal Current (A)	$R_{DS(ON)}$ (mΩ) at 25°C	Description
<b>B PLATFORM</b> standard 62 mm	CAS175M12BM3	1200	175	8	Half-Bridge, C3M™ MOSFETs + Schottky Diodes
	WAS175M12BM3	1200	175	8	Half-Bridge, THB-80 Qualified, C3M MOSFETs + Schottky Diodes
	HAS175M12BM3	1200	175	8	Half-Bridge, Enhanced for Harsh Environment, C3M MOSFETs + Schottky Diodes
	CAS350M12BM3	1200	350	4	Half-Bridge, C3M MOSFETs + Schottky Diodes
	WAS350M12BM3	1200	350	4	Half-Bridge, THB-80 Qualified, C3M MOSFETs + Schottky Diodes
	HAS350M12BM3	1200	350	4	Half-Bridge, Enhanced for Harsh Environment, C3M MOSFETs + Schottky Diodes
	CAB530M12BM3	1200	530	2.7	Half-Bridge, C3M MOSFETs
	CAS530M12BM3	1200	530	2.7	Half-Bridge, C3M MOSFETs + Schottky Diodes
	WAS530M12BM3	1200	530	2.7	Half-Bridge, THB-80 Qualified, C3M MOSFETs + Schottky Diodes
	HAS530M12BM3	1200	530	2.7	Half-Bridge, Enhanced for Harsh Environment, C3M MOSFETs + Schottky Diodes
	CAS310M17BM3	1700	310	5	Half-Bridge, C3M MOSFETs + Schottky Diodes
	HAS310M17BM3	1700	310	5	Half-Bridge, Enhanced for Harsh Environment, C3M MOSFETs + Schottky Diodes
	WAS310M17BM3	1700	310	5	Half-Bridge, THB-80 Qualified, C3M MOSFETs + Schottky Diodes

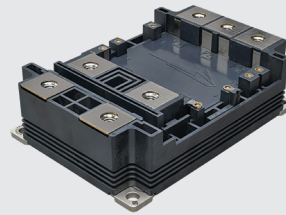
# L MODULE PLATFORM

## ENABLING HIGH EFFICIENCY AND RELIABILITY IN HIGH-POWER APPLICATIONS

Wolfspeed has developed the LM power module platform to provide the benefits of silicon carbide in applications that require increased power density, high reliability, faster switching and long lifetime. The LM module enables 175°C continuous junction temperature operation with high thermal conductivity Silicon Nitride (Si3N4) substrate to ensure mechanical robustness under extreme conditions and a lightweight AlSiC baseplate. The 3300 V power modules are a perfect fit for demanding applications such as heavy equipment, solid state circuit breakers, industrial UPSs and motor drives, and more.

**MODULE SIZE:**  
100 x 144 x 40 (mm)

**TOPOLOGY:**  
Half-Bridge



### FEATURES

Low RDS(ON)

AlSiC baseplate

High thermal conductivity AMB SiN substrates (90 W/m·K at 25°C)

Exemplary thermal-mechanical cycling performance

Low stray Inductance (10 nH)



### BENEFITS

Faster switching speeds and higher efficiencies than Si IGBTs

Lower system-level volume, weight, and cost

Candidate for reduced or no cooling requirements

Wide operating temperature range, -55°C to 175°C



### APPLICATIONS

Heavy Duty Industrial E-Mobility

Ultra-Fast DC Chargers

Industrial Motor Drives

Industrial Uninterruptible Power Supply (UPS) Systems

Marine and Aerospace Propulsion

Terrestrial Power Distribution Systems

High Voltage Direct Current (HVDC) and Flexible AC Transmission System (FACTS) Controllers

Part Number	Blocking Voltage (V)	Nominal Current (A)	R <sub>DS(ON)</sub> (mΩ) at 25°C	Description
CAB600M33LM3	3300	770	2.7	Half-Bridge, Industrial Qualified, C3M MOSFETs

**L PLATFORM**  
standard 144 mm

# X MODULE PLATFORM

ENABLER TO **MAXIMIZE POWER DENSITY WHILE MINIMIZING LOOP** INDUCTANCE AND SIMPLIFY POWER BUSSING

Wolfspeed has developed the XM3 power module platform to maximize the benefits of Silicon Carbide while keeping the module and system design robust, simple, and cost effective. With half the weight and volume of a standard 62 mm module, the XM3 power module maximizes power density while minimizing loop inductance and enabling simple power bussing. The XM3's Silicon Carbide optimized packaging enables 175°C continuous junction operation with a high reliability silicon nitride (Si<sub>3</sub>N<sub>4</sub>) power substrate to ensure mechanical robustness under extreme conditions.

**SUPPORTING GATE DRIVER:**

- CGD12HBXMP
- FRDMGD3160XM3EVM
- CGD1700HB2P-XM3
- UCC5880QEVN-057
- UCC5880INVERTEREVM

**MODULE SIZE:**

80 x 53 x 19 (mm)

**TOPOLOGY:**

Half-Bridge

**SUPPORTING EVALUATION KIT:**

- KIT-CRD-CIL12N-XM3
- KIT-CRD-CIL17N-XM3

**SUPPORTING REFERENCE DESIGNS:**

- CRD\*\*\*DA12E-XM3
- \*\*\*=200, 250, 300, 600



## FEATURES

- 50% Smaller/Lighter than Standard 62 mm Footprint
- Conduction Loss / Switching Loss Optimized Versions
- Allow For Simple and Low-Inductance Busbar Interconnection
- High Reliability Power Substrate to Address Demanding Markets



## BENEFITS

- Lightweight, Compact Form Factor with 62 mm Compatible Baseplate Enables System Retrofit
- Increased System Efficiency, Due to Low Switching & Conduction Losses of Silicon Carbide
- High Reliability, Robust Material Selection



## APPLICATIONS

- Traction Inverter / Motor Drive
- Power Supplies / UPS
- Test and Production Equipment
- Aerospace / eVTOL
- EV Fast Charging
- Medical

	Part Number	Blocking Voltage (V)	Nominal Current (A)	R <sub>DS(ON)</sub> (mΩ) at 25°C	Description
<b>X PLATFORM</b> standard 52 mm	CAB400M12XM3	1200	400	4	Half-Bridge, C3M™ Switching-Optimized MOSFETs
	CAB425M12XM3	1200	425	3.2	Half-Bridge, C3M Switching-Optimized MOSFETs
	CAB450M12XM3	1200	450	2.6	Half-Bridge, C3M Conduction-Optimized MOSFETs
	EAB450M12XM3	1200	450	2.6	Automotive grade, Half-Bridge, C3M Conduction-Optimized MOSFETs
	CAB320M17XM3	1700	320	4	Half-Bridge, C3M MOSFETs

# H MODULE PLATFORM

THE BEST-IN-CLASS 62 MM SILICON CARBIDE MODULES AT WOLFSPEED'S **HIGHEST POWER DENSITY, LOWEST INDUCTANCE IN A LIGHTWEIGHT & COMPACT PACKAGE DESIGN**

Wolfspeed has developed the HM power module platform to provide the benefits of Silicon Carbide in power density sensitive applications while maintaining the baseplate compatibility of a 62 mm module. The HM platform's Silicon Carbide optimized packaging enables

175°C continuous junction operation with a high-reliability Silicon Nitride ( $\text{Si}_3\text{N}_4$ ) power substrate to ensure mechanical robustness under extreme conditions and a lightweight AlSiC baseplate.

**SUPPORTING GATE DRIVER:**

CGD1700HB3P-HM3

**SUPPORTING EVALUATION KIT:**

KIT-CRD-CIL12N-HM3

KIT-CRD-CIL17N-HM3

**MODULE SIZE:**

110 mm x 65 mm x 12.2 mm

**TOPOLOGY:**

Half-Bridge



## FEATURES

Low Inductance, Low Profile 62 mm Footprint

High Junction Temperature (175 °C) Operation

Light Weight AlSiC Baseplate

High Reliability Silicon Nitride Insulator



## BENEFITS

Lightweight, Compact Form Factor with 62 mm Compatible Baseplate Enables System Retrofit

Increased System Efficiency, Due to Low Switching & Conduction Losses of Silicon Carbide

High Reliability Material Selection



## APPLICATIONS

Railway Technology

High Performance Motor Sports

EV Fast Charging

On-Board Charging

Industrial Automation & Testing

Medical power

	Part Number	Blocking Voltage (V)	Nominal Current (A)	$R_{DS(ON)}$ (mΩ) at 25°C	Description
H PLATFORM optimized 62 mm	CAS480M12HM3	1200	480	2.29	Half-Bridge, C3M™ MOSFETs + Schottky Diodes
	CAR600M12HN6	1200	600	N/A	Half-Bridge Rectifier, Gen 6 Schottky Diodes
	CAB760M12HM3	1200	760	1.33	Half-Bridge, C3M MOSFETs
	CAB760M12HM3R	1200	760	1.33	Half-Bridge Right Signal Pins for Paralleling, C3M MOSFETs
	CAS380M17HM3	1700	380	3.3	Half-Bridge, C3M MOSFETs + Schottky Diodes
	CAB500M17HM3	1700	500	2.5	Half-Bridge, C3M MOSFETs
	CAR600M17HN6	1700	600	N/A	Half-Bridge Rectifier, Gen 6 Schottky Diodes
	CAB650M17HM3	1700	650	1.67	Half-Bridge, C3M MOSFETs

# ACHIEVE DESIGN FLEXIBILITY WHILE MAXIMIZING PERFORMANCE

Designing systems for tough operating conditions while meeting strict industry's standards sometimes requires utmost flexibility to optimize the layout.

Our extensive portfolio of MOSFETs and Schottky diodes spans 17 different package footprints and addresses common layout requirements for harsh industrial and automotive applications ranging from 1 kW to 60 kW of power.

As pioneers of the first commercially released AEC-Q101 SiC Schottky diode and MOSFET, we continue innovating to optimize our materials and product offerings. When leveraged together, our MOSFETs and Schottky diodes can further improve system performance and cost structure for a variety of demanding industrial and renewable energy applications.

## WOLFSPEED® DISCRETE POWER | PACKAGE GUIDE

MOSFETs	D	K	K1	J	J1	J2	L	P
	<b>TO-247-3</b> Std. Package	<b>TO-247-4</b> Kelvin Lead	<b>TO-247-4 LP</b> Kelvin Lead Low Profile	<b>TO-263-7</b> Small Drain Footprint	<b>TO-263-7 XL</b> Larger Drain Footprint	<b>TO-263-7 XL</b> Automotive Qualified	<b>TOLL</b> TO-Lead Less	<b>TO-247-4 PLUS</b> Kelvin Lead

Schottky Diodes	A	D	D1	E	F	G	H	I	Q
	<b>TO-220-2</b> Std. Package	<b>TO-247-3</b> Dual Die	<b>TO-247-3</b> Single Die	<b>TO-252-2</b> Smaller Footprint	<b>TO-220-2-F2</b> No Back Metal	<b>TO-263-2</b> Better Thermals	<b>TO-247-2</b> More Creepage	<b>TO-220-2-ISO</b> Isolated Metal Tab	<b>QFN 8x8</b> Smallest Footprint

## WOLFSPEED® DISCRETE POWER | DEVICE NOMENCLATURE GUIDE

Example: C3M0060065D

	C	3	M	0060	065	D
	-	-	-	----	---	--
MOSFETs	Qualification Grade	Product Series	Device Type	Typ Rdson @ 25C	Voltage Rating	Package
	C = Industrial E = Automotive	2 3 ...	M = MOSFET	Ex = 0060 = 60 mΩ	Ex = 065 = 650 V	D = TO-247-3 K1 = TO-247-4-LP K = TO-247-4 J = TO-263-7 J1, J2 = TO-263-7-XL L = TOLL P = TO-247-4-PLUS

Example: E4D20120D

	E	4	D	20	120	D
	-	-	-	----	---	--
Schottky Diodes	Qualification Grade	Product Series	Device Type	Current Rating	Voltage Rating	Package
	C = Industrial E = Automotive	2 3 4 ...	D = Diode	Ex = 20 = 20 A	Ex = 120 = 1200 V	A = TO-220-2 D = TO-247-3 D1 = TO-247-3 E = TO-252-2 F = TO-220-2-F2 G = TO-263-2 H = TO-247-2 I = TO-220-2-ISO Q = QFN 8x8

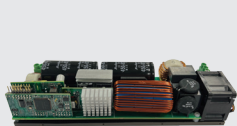
# 650 V SILICON CARBIDE MOSFETs

## BROADEST PORTFOLIO OF 650 V SILICON CARBIDE MOSFETS FOR EFFICIENCY

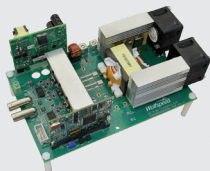
Wolfspeed is proud to offer our 3rd-Generation 650 V MOSFETs, enabling smaller, lighter, and highly efficient power conversion in an even wider range of power systems.

The 650 V MOSFET product family is ideal for applications including high performance industrial power supplies, server/telecom power, electric vehicle charging systems, energy storage systems, uninterruptible power supplies, and battery management systems.

### FEATURED DESIGN TOOLS



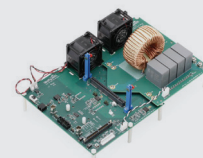
**3.6 kW Bridgeless Totem-Pole PFC**  
CRD-03600AD065E-L



**6.6 kW High Frequency DC-DC Converter**  
CRD-06600DD065N



**6.6 kW High Power Density Bi-Directional EV On-Board Charger**  
CRD-06600FF065N-K



**SpeedVal™ Kit Modular Evaluation Platform**  
SpeedVal™ Kit



### FEATURES

Low  $R_{DS(ON)}$  over Temperature

Low Device Capacitances

Kelvin Source Pin

High Temperature Operation ( $T_j = 175^\circ\text{C}$ )

Fast Diode with Ultra Low Reverse Recovery



### BENEFITS

Improves System Efficiency with Lower Conduction Losses

Enables High Switching Frequency Operation

Improves System Level Power Density

Reduces System Size, Weight, and Cooling Requirements

Enables New Hard Switching Topologies (Totem-Pole PFC)



### APPLICATIONS

On-Board Charger

Industrial Power Supplies

Server/Telecom

EV Fast Charging

Energy Storage Systems (ESS)

Uninterruptible Power Supplies (UPS)

Battery Management Systems (BMS)

Part Number	Qualification	Blocking Voltage (V)	$R_{DS(ON)}$ at 25°C	Current Rating at 25°C (A)	Package
C3M0015065D	Industrial	650	15 mΩ	120	TO-247-3
C3M0015065K	Industrial	650	15 mΩ	120	TO-247-4
C3M0025065D	Industrial	650	25 mΩ	97	TO-247-3
C3M0025065J1	Industrial	650	25 mΩ	80	TO-263-7
C3M0025065K	Industrial	650	25 mΩ	97	TO-247-4
C3M0025065L	Industrial	650	25 mΩ	77	TOLL
C3M0045065D	Industrial	650	45 mΩ	49	TO-247-3
C3M0045065J1	Industrial	650	45 mΩ	47	TO-263-7
C3M0045065K	Industrial	650	45 mΩ	49	TO-247-4
E3M0045065K	Automotive	650	45 mΩ	46	TO-247-4
C3M0045065L	Industrial	650	45 mΩ	49	TOLL
C3M0060065D	Industrial	650	60 mΩ	29	TO-247-3
C3M0060065J	Industrial	650	60 mΩ	36	TO-263-7
C3M0060065L	Industrial	650	60 mΩ	39	TOLL
C3M0060065K	Industrial	650	60 mΩ	37	TO-247-4
E3M0060065K	Automotive	650	60 mΩ	37	TO-247-4
C3M0120065D	Industrial	650	120 mΩ	22	TO-247-3
C3M0120065J	Industrial	650	120 mΩ	21	TO-263-7
C3M0120065K	Industrial	650	120 mΩ	22	TO-247-4
C3M0120065L	Industrial	650	120 mΩ	21	TOLL

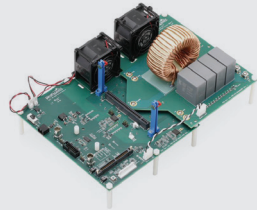
# 750 V SILICON CARBIDE MOSFETs

## WOLFSPEED® SILICON CARBIDE SOLUTIONS ENABLING HIGHER SYSTEM DENSITY

Wolfspeed's 750 V silicon carbide MOSFETs enable smaller, lighter, and highly-efficient power conversion in a wider range of power systems. The new featured low-profile package provides improved assembly performance through increased solderability, thinner Gate and Kelvin pins reducing risk of solder bridging, and lower package inductance.

The 750 V MOSFET product family is ideal for applications including high performance industrial power supplies, server/telecom power, electric vehicle charging systems, energy storage systems, uninterruptible power supplies, and battery management systems.

### FEATURED DESIGN TOOLS



SpeedVal™ Kit Modular Evaluation Platform  
SpeedVal™ Kit



### FEATURES

Optimized package with separate driver source pin

Through hole, surface mount and top side cooled packages available

High blocking voltage with low on-resistance

High-speed switching with low capacitances

Fast intrinsic diode with low reverse recovery (Q<sub>rr</sub>)



### BENEFITS

Reduce switching losses and minimize gate ringing

Higher system efficiency

Reduce cooling requirements

Increase power density

Increase system switching frequency



### APPLICATIONS

Motor Control

EV On and Off Board Chargers

High Voltage DC/DC Converters

Power Supply

Solar/ESS

UPS

EV HVAC Motor Drives

Fuel Cell Vehicle Converters

Part Number	Qualification	Blocking Voltage (V)	R <sub>DS(ON)</sub> at 25°C	Current Rating (A)	Package
E4M0015075J2	Automotive	750	15	156	TO-263-7 XL
C3M0015075K1	Industrial	750	15	128	TO-247-4 LP
E4M0015075K1	Automotive	750	15	128	TO-247-4 LP
E4M0025075J2	Automotive	750	25	84	TO-263-7 XL
C3M0025075K1	Industrial	750	25	80	TO-247-4 LP
E4M0025075K1	Automotive	750	25	80	TO-247-4 LP
E4M0045075J2	Automotive	750	45	46	TO-263-7 XL
C3M0045075K1	Industrial	750	45	42	TO-247-4 LP
E4M0045075K1	Automotive	750	45	42	TO-247-4 LP
E4M0060075J2	Automotive	750	60	36	TO-263-7 XL
C3M0060075K1	Industrial	750	60	35	TO-247-4 LP
E4M0060075K1	Automotive	750	60	35	TO-247-4 LP

# 1200 V SILICON CARBIDE MOSFETs

## BROADEST PORTFOLIO OF 1200 V SILICON CARBIDE MOSFETs FOR EFFICIENCY

Wolfspeed's latest generation of Silicon Carbide MOSFETs set the standard for performance, ruggedness and ease of design-in. Extremely fast switching, ultra-low switching losses, stable

conduction losses over temperature assure significant improvement of system efficiency, power density and overall BOM cost versus silicon MOSFET and IGBT incumbants.

### FEATURED DESIGN TOOLS



**30 kW DISCRETE INTERLEAVED LLC DC-DC CONVERTER**  
CRD30DD12N-K



**60 kW INTERLEAVED BOOST CONVERTER**  
CRD-60DD12N



### FEATURES

- Low  $R_{DS(ON)}$  Over Temperature
- Fast, rugged intrinsic Silicon Carbide body diode
- High Temperature Operation ( $T_J=175^\circ\text{C}$ )



### BENEFITS

- Lowest Possible Switching and Conduction Losses
- Minimizes System Heat-Sink Requirement
- Enables High Power Density Designs



### APPLICATIONS

- Energy Storage
- Solar Inverters
- EV On and Off Board Chargers
- UPS and Motor Drive
- EV HVAC Motor Drives
- Auxiliary Power Supply

Part Number	Qualification	Blocking Voltage (V)	$R_{DS(ON)}$ at 25°C	Current Rating at 25°C (A)	Package
C3M0016120D	Industrial	1200	16	115	TO-247-3
C3M0016120K	Industrial	1200	16	115	TO-247-4
E3M0016120K	Automotive	1200	16	125	TO-247-4
C3M0016120K1	Industrial	1200	16	125	TO-247-4 LP
C3M0021120J2	Industrial	1200	21	114	TO-263-7 XL
E3M0021120J2	Automotive	1200	21	114	TO-263-7 XL
E3M0021120K	Automotive	1200	21	104	TO-247-4
C3M0021120K1	Industrial	1200	21	104	TO-247-4 LP
C3M0021120D	Industrial	1200	21	100	TO-247-3
C3M0021120K	Industrial	1200	21	100	TO-247-4
C3M0032120J2	Industrial	1200	32	74	TO-263-7 XL
E3M0032120J2	Automotive	1200	32	74	TO-263-7 XL
C3M0032120J1	Industrial	1200	32	68	TO-263-7
E3M0032120K	Automotive	1200	32	67	TO-247-4
C3M0032120K1	Industrial	1200	32	67	TO-247-4 LP
C3M0032120D	Industrial	1200	32	63	TO-247-3
C3M0032120K	Industrial	1200	32	63	TO-247-4
C3M0040120D	Industrial	1200	40	66	TO-247-3
C3M0040120K	Industrial	1200	40	66	TO-247-4
C3M0040120J1	Industrial	1200	40	64	TO-263-7
C3M0040120J2	Industrial	1200	40	63	TO-263-7 XL
E3M0040120J2	Automotive	1200	40	63	TO-263-7 XL

Part Number	Qualification	Blocking Voltage (V)	$R_{DS(ON)}$ at 25°C	Current Rating at 25°C (A)	Package
E3M0040120K	Automotive	1200	40	57	TO-247-4
C3M0040120K1	Industrial	1200	40	57	TO-247-4 LP
C3M0060120J2*	Industrial	1200	60	48	TO-263-7 XL
C3M0060120K*	Industrial	1200	60	45	TO-247-4
C3M0060120K1*	Industrial	1200	60	43	TO-247-4 LP
C3M0075120J2	Industrial	1200	75	34	TO-263-7 XL
E3M0075120J2	Automotive	1200	75	34	TO-263-7 XL
C3M0075120K1	Industrial	1200	75	34	TO-247-4 LP
C3M0075120D-A	Industrial	1200	75	32	TO-247-3
C3M0075120K	Industrial	1200	75	32	TO-247-4
C3M0075120K-A	Industrial	1200	75	30	TO-247-4
C3M0075120D	Industrial	1200	75	30	TO-247-3
C3M0075120J	Industrial	1200	75	30	TO-263-7
E3M0075120K	Automotive	1200	75	30	TO-247-4
E3M0160120J2	Automotive	1200	160	18	TO-263-7 XL
C3M0160120K1	Industrial	1200	160	18	TO-247-4 LP
C3M0160120D	Industrial	1200	160	17	TO-247-3
C3M0160120J	Industrial	1200	160	17	TO-263-7
E3M0160120K	Automotive	1200	160	17	TO-247-4
C3M0350120D	Industrial	1200	350	7.6	TO-247-3
C3M0350120J	Industrial	1200	350	7.2	TO-263-7

\*Coming Soon



# 1700 V SILICON CARBIDE MOSFETs

## FASTER SWITCHING, ENHANCED RELIABILITY FOR SUPERIOR POWER CONVERSION

Wolfspeed's 1700 V Silicon Carbide MOSFETs enable smaller and more efficient power conversion systems. Compared to silicon-based solutions, Wolfspeed Silicon Carbide technology enables increased

system power density, higher switching frequencies, smaller designs, cooler components, reduced size of components like inductors, capacitors, filters & transformers, and overall cost benefits.

### FEATURED DESIGN TOOLS



**WIDE INPUT VOLTAGE RANGE (300 VDC – 1200 VDC) 15W FLYBACK AUXILIARY POWER SUPPLY BOARD CRD-15DD17P**



### FEATURES

High Blocking Voltage with Low  $R_{DS(ON)}$

High Speed Switching with Low Capacitances

Fast Intrinsic Diode with Low Reverse Recovery ( $Q_{rr}$ )

Low Parasitic Inductance

~8 mm Creepage and Clearance Distance



### BENEFITS

Higher System Efficiency

Increased System Switching Frequency

Enables Hard-Switching Topologies

Separate Kelvin Source Pin Lowers Source Inductance and Provides Up To 30% Lower Switching Losses

Robust Isolation With Wide

Creepage and Clearance Distance Between Drain and Source



### APPLICATIONS

Auxiliary Power Supplies

Switch Mode Power Supplies

Power Inverters

1500 V Solar Inverters

High Voltage DC-DC Converters

Motor Drives

Pulsed Power Applications

Part Number	Qualification	Blocking Voltage (V)	$R_{DS(ON)}$ at 25°C	Current Rating at 25°C (A)	Package
C2M0045170D	Industrial	1700	45 mΩ	72	TO-247-3
C2M0045170P	Industrial	1700	45 mΩ	72	TO-247-4 Plus
C3M0800170D*	Industrial	1700	800 mΩ	7	TO-247-3
C3M0800170J*	Industrial	1700	800 mΩ	6.3	TO-263-7
C3M0800170M*	Industrial	1700	800 mΩ	5.5	TO-247-3 (FullPAK)
C2M1000170J	Industrial	1700	1000 mΩ	5.3	TO-263-7
C2M1000170D	Industrial	1700	1000 mΩ	5	TO-247-3

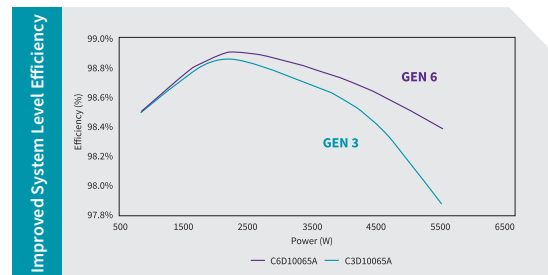
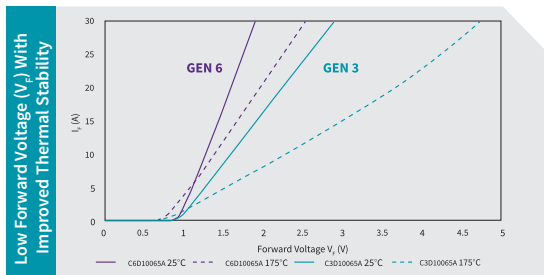
\*Coming Soon

# SILICON CARBIDE SCHOTTKY DIODES

## Wolfspeed's Latest Generation (C6D) Schottky Diodes

Wolfspeed's Silicon Carbide diode portfolio offers multiple generations to meet diverse application requirements. Wolfspeed's continually expanding 6th generation Silicon Carbide Schottky diode family offers best-in-class forward

voltage drop ( $V_F$  (25 °C) = 1.27 V &  $V_F$  (175 °C) = 1.5 V). This improvement further reduces conduction losses and boosts overall system efficiency – even in the most demanding power conversion applications.



### FEATURES

- Low  $V_F$  (25 °C) = 1.27 V & (175 °C) = 1.5 V
- Positive Temperature Co-efficient
- Zero Reverse Recovery
- Robust MPS Technology
- Low Figure of Merit ( $Q_c \times V_F$ )
- Wide Range of  $T_J$  (-55°C to 175°C)



### BENEFITS

- Improved System Level Efficiency
- High Surge Current Capability
- High Frequency Operation
- Cost Effective High Power Density
- Easy Parallel Operation
- Reduced Heat Sink Requirements



### APPLICATIONS

- Enterprise Power, Server, & Telecom
- Uninterruptible Power Supplies (UPS)
- Consumer Electronics
- Industrial Power Supplies
- Solar Energy Systems
- Medical Power Supplies

Part Number	Qualification	Blocking Voltage (V)	Current Rating at 25°C (A)	Package
C6D04065A	Industrial	650	4	TO-220-2
C6D04065E	Industrial	650	4	TO-252-2
C6D06065A	Industrial	650	6	TO-220-2
C6D06065E	Industrial	650	6	TO-252-2
C6D06065G	Industrial	650	6	TO-263-2
C6D06065Q	Industrial	650	6	QFN 8x8
C6D08065A	Industrial	650	8	TO-220-2
C6D08065E	Industrial	650	8	TO-252-2
C6D08065G	Industrial	650	8	TO-263-2
C6D08065Q	Industrial	650	8	QFN 8x8
C6D10065A	Industrial	650	10	TO-220-2
C6D10065E	Industrial	650	10	TO-252-2
C6D10065G	Industrial	650	10	TO-263-2
C6D10065Q	Industrial	650	10	QFN 8x8
C6D16065D	Industrial	650	16	TO-247-3
C6D16065H	Industrial	650	16	TO-247-2
C6D20065A	Industrial	650	20	TO-220-2
C6D20065D	Industrial	650	20	TO-247-3
C6D20065G	Industrial	650	20	TO-263-2
C6D20065H	Industrial	650	20	TO-247-2
C6D20065D1	Industrial	650	20	TO-247-3
C6D30065H	Industrial	650	30	TO-247-2
C6D05170H	Industrial	1700	5	TO-247-2
C6D10170H	Industrial	1700	10	TO-247-2
C6D25170H	Industrial	1700	25	TO-247-2

# SILICON CARBIDE SCHOTTKY DIODES

Wolfspeed Silicon Carbide diodes make efficient systems cost effective through a diverse portfolio of different power ranges and package footprints to fit all applications.

	Part Number	Qualification	Blocking Voltage (V)	Current Rating (A)	Package
600 V DISCRETE	CSD01060A	Industrial	600	1	TO-220-2
	CSD01060E	Industrial	600	1	TO-252-2
	C3D02060A	Industrial	600	2	TO-220-2
	C3D02060E	Industrial	600	2	TO-252-2
	C3D02060F	Industrial	600	2	TO-220-F2
	C3D03060A	Industrial	600	3	TO-220-2
	C3D03060E	Industrial	600	3	TO-252-2
	C3D03060F	Industrial	600	3	TO-220-F2
	C3D04060A	Industrial	600	4	TO-220-2
	C3D04060E	Industrial	600	4	TO-252-2
	C3D04060F	Industrial	600	4	TO-220-F2
	C3D06060A	Industrial	600	6	TO-220-2
	C3D06060F	Industrial	600	6	TO-220-F2
	C3D06060G	Industrial	600	6	TO-263-2
	C3D08060A	Industrial	600	8	TO-220-2
	C3D08060G	Industrial	600	8	TO-263-2
	C3D10060A	Industrial	600	10	TO-220-2
	C3D10060G	Industrial	600	10	TO-263-2
	C3D16060D	Industrial	600	16	TO-247-3
	C3D20060D	Industrial	600	20	TO-247-3

	Part Number	Qualification	Blocking Voltage (V)	Current Rating (A)	Package
650 V DISCRETE	C3D02065E	Industrial	650	2	TO-252-2
	C3D03065E	Industrial	650	3	TO-252-2
	C3D04065A	Industrial	650	4	TO-220-2
	C3D04065E	Industrial	650	4	TO-252-2
	C6D04065A	Industrial	650	4	TO-220-2
	C6D04065E	Industrial	650	4	TO-252-2
	C3D06065A	Industrial	650	6	TO-220-2
	C3D06065E	Industrial	650	6	TO-252-2
	C3D06065I	Industrial	650	6	TO-220 Iso
	C6D06065A	Industrial	650	6	TO-220-2
	C6D06065E	Industrial	650	6	TO-252-2
	C6D06065G	Industrial	650	6	TO-263-2

	Part Number	Qualification	Blocking Voltage (V)	Current Rating (A)	Package
650 V DISCRETE	C6D06065Q	Industrial	650	6	QFN 8x8
	C3D08065A	Industrial	650	8	TO-220-2
	C3D08065E	Industrial	650	8	TO-252-2
	C3D08065I	Industrial	650	8	TO-220 Iso
	C6D08065A	Industrial	650	8	TO-220-2
	C6D08065E	Industrial	650	8	TO-252-2
	C6D08065G	Industrial	650	8	TO-263-2
	C6D08065Q	Industrial	650	8	QFN 8x8
	C3D10065A	Industrial	650	10	TO-220-2
	C3D10065E	Industrial	650	10	TO-252-2
	C3D10065I	Industrial	650	10	TO-220 Iso
	C6D10065A	Industrial	650	10	TO-220-2
	C6D10065E	Industrial	650	10	TO-252-2
	C6D10065G	Industrial	650	10	TO-263-2
	C6D10065Q	Industrial	650	10	QFN 8x8
	C3D12065A	Industrial	650	12	TO-220-2
	C3D16065D1	Industrial	650	16	TO-247-3
	C3D16065A	Industrial	650	16	TO-220-2
	C3D16065D	Industrial	650	16	TO-247-3
	C6D16065D	Industrial	650	16	TO-247-3
	C6D16065H	Industrial	650	16	TO-247-2
	C3D20065D	Industrial	650	20	TO-247-3
	C6D20065A	Industrial	650	20	TO-220-2
	C6D20065G	Industrial	650	20	TO-263-2
	C6D20065H	Industrial	650	20	TO-247-2
	C6D20065D	Industrial	650	20	TO-247-3
	C6D20065D1	Industrial	650	20	TO-247-3
	C6D30065H	Industrial	650	30	TO-247-2
	C3D30065D	Industrial	650	30	TO-247-3

Part Number	Qualification	Blocking Voltage (V)	Current Rating (A)	Package
C4D02120A	Industrial	1200	2	TO-220-2
C4D02120E	Industrial	1200	2	TO-252-2
C4D05120A	Industrial	1200	5	TO-220-2
C4D05120E	Industrial	1200	5	TO-252-2
C4D08120A	Industrial	1200	8	TO-220-2
C4D08120E	Industrial	1200	8	TO-252-2
C4D10120A	Industrial	1200	10	TO-220-2
C4D10120D	Industrial	1200	10	TO-247-3
C4D10120E	Industrial	1200	10	TO-252-2
C4D10120H	Industrial	1200	10	TO-247-2
C4D15120A	Industrial	1200	15	TO-220-2
C4D15120D	Industrial	1200	15	TO-247-3
C4D15120H	Industrial	1200	15	TO-247-2
C4D20120A	Industrial	1200	20	TO-220-2
C4D20120D	Industrial	1200	20	TO-247-3
C4D20120H	Industrial	1200	20	TO-247-2
C4D30120D	Industrial	1200	30	TO-247-3
C4D30120H	Industrial	1200	30	TO-247-2
C4D40120D	Industrial	1200	40	TO-247-3
C4D40120H	Industrial	1200	40	TO-247-2

C6D05170H	Industrial	1700	5	TO-247-2
C6D10170H	Industrial	1700	10	TO-247-2
C6D25170H	Industrial	1700	25	TO-247-2

Part Number	Qualification	Blocking Voltage (V)	Current Rating (A)	Package
E3D08065G	Automotive	650	8	TO-263-2
E3D20065D	Automotive	650	20	TO-247-3
E3D30065D	Automotive	650	30	TO-247-3
E4D02120E	Automotive	1200	2	TO-252-2
E4D10120A	Automotive	1200	10	TO-220-2
E4D20120A	Automotive	1200	20	TO-220-2
E4D20120D	Automotive	1200	20	TO-247-3
E4D20120G	Automotive	1200	20	TO-263-2
E6D10065A	Automotive	650	10	TO-220-2
E6D10065G	Automotive	650	10	TO-263-2
E6D16065A	Automotive	650	16	TO-220-2
E6D16065D1	Automotive	650	16	TO-247-3
E6D16065G	Automotive	650	16	TO-263-2
E6D16065H	Automotive	650	16	TO-247-2
E6D20065A	Automotive	650	20	TO-220-2
E6D20065D	Automotive	650	20	TO-247-3
E6D20065G	Automotive	650	20	TO-263-2
E6D20065H	Automotive	650	20	TO-247-2
E6D30065A	Automotive	650	30	TO-220-2
E6D30065D	Automotive	650	30	TO-247-3
E6D30065G	Automotive	650	30	TO-263-2
E6D30065H	Automotive	650	30	TO-247-2
E6D40065A	Automotive	650	40	TO-220-2
E6D40065D	Automotive	650	40	TO-247-3
E6D40065G	Automotive	650	40	TO-263-2
E6D40065H	Automotive	650	40	TO-247-2

# E-SERIES™ AUTOMOTIVE SILICON CARBIDE PRODUCTS

## AUTOMOTIVE-QUALIFIED SILICON CARBIDE PRODUCTS

Wolfspeed continues to lead the end of the ICE vehicle age with our diverse E-Series portfolio of Silicon Carbide MOSFETs and Schottky Diodes. E-Series products are automotive qualified and PPAP capable,

specifically designed to be robust and reliable in the harshest environments. These devices are optimized for use in multiple on-board automotive applications across battery electric, plug-in electric, and fuel cell vehicles.

### FEATURED DESIGN TOOLS



**22 kW High Efficient Bi-directional AFE**

CRD-22AD12N



**22 kW Bi-Directional CLLC Utilizing IMS Board**

CRD-22DD12N-J2



**6.6 kW High Power Density Bi-directional EV ON-Board Charger**

CRD-06600FF065N-K



### FEATURES

Automotive Qualified (AEC-Q101) and PPAP Capable

Low MOSFET  $R_{DS(ON)}$  and Schottky Diode  $V_F$  Over Temperature

Fast Intrinsic Diode with Low Reverse Recovery ( $Q_{rr}$ ) MOSFETs

Low Forward Voltage ( $V_F$ ) Diodes



### BENEFITS

High-Voltage, High-Temperature, and High-Humidity Resistance

Higher Power Density Enabling Smaller System Form Factor

Improves System Efficiency with Lower Switching & Conduction Losses

Enables High-Reliability Operation



### APPLICATIONS

Electric Vehicle On-Board Charging

High Voltage DC-DC Converters

Auxiliary Power Supplies

Fuel Cell Vehicle Converters

Traction Inverters

EV HVAC Motor Drives

Part Number	Blocking Voltage (V)	Current Rating at 25°C (A)	Package
E3D08065G	650	8	TO-263-2
E3D20065D	650	20	TO-247-3
E3D30065D	650	30	TO-247-3
E4D02120E	1200	2	TO-252-2
E4D10120A	1200	10	TO-220-2
E4D20120A	1200	20	TO-220-2
E4D20120D	1200	20	TO-247-3
E4D20120G	1200	20	TO-263-2
E6D10065A	650	10	TO-220-2
E6D10065G	650	10	TO-263-2
E6D16065A	650	16	TO-220-2
E6D16065D1	650	16	TO-247-3
E6D16065G	650	16	TO-263-2
E6D16065H	650	16	TO-247-2
E6D20065A	650	20	TO-220-2
E6D20065D	650	20	TO-247-3

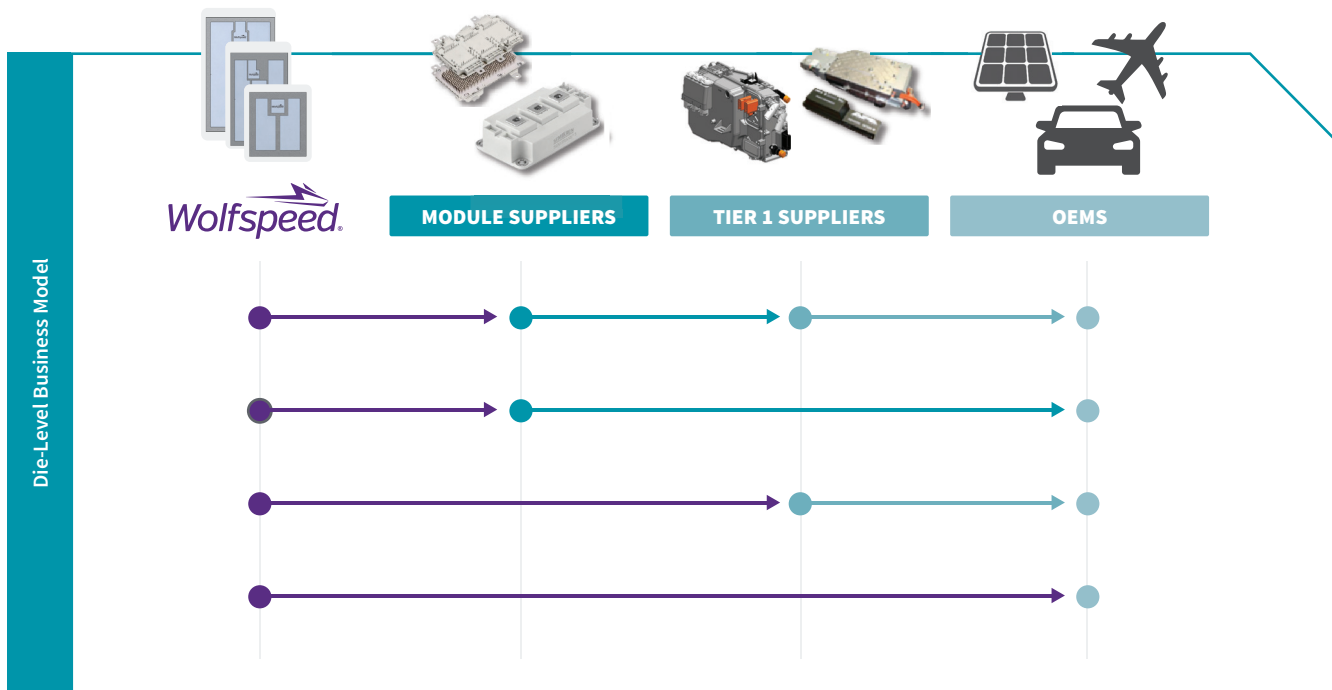
Part Number	Blocking Voltage (V)	Current Rating at 25°C (A)	Package
E6D20065G	650	20	TO-263-2
E6D20065H	650	20	TO-247-2
E6D30065A	650	30	TO-220-2
E6D30065D	650	30	TO-247-3
E6D30065G	650	30	TO-263-2
E6D30065H	650	30	TO-247-2
E6D40065A	650	40	TO-220-2
E6D40065D	650	40	TO-247-3
E6D40065G	650	40	TO-263-2
E6D40065H	650	40	TO-247-2

Part Number	Blocking Voltage (V)	$R_{DS(on)}$ at 25°C	Current Rating at 25°C (A)	Package
E3M0045065K	650	45 mΩ	46	TO-247-4
E3M0060065K	650	60 mΩ	37	TO-247-4
E4M0015075J2	750	15 mΩ	156	TO-263-7 XL
E4M0015075K1	750	15 mΩ	128	TO-247-4 LP
E4M0025075J2	750	25 mΩ	84	TO-263-7 XL
E4M0025075K1	750	25 mΩ	80	TO-247-4 LP
E4M0045075J2	750	45 mΩ	46	TO-263-7 XL
E4M0045075K1	750	45 mΩ	42	TO-247-4 LP
E4M0060075J2	750	60 mΩ	36	TO-263-7 XL
E4M0060075K1	750	60 mΩ	35	TO-247-4 LP
E4M0013120K	1200	13 mΩ	153	TO-247-4
E3M0021120J2	1200	21 mΩ	114	TO-263-7 XL
E3M0032120J2	1200	32 mΩ	74	TO-263-7 XL
E3M0040120J2	1200	40 mΩ	63	TO-263-7 XL
E3M0075120J2	1200	75 mΩ	34	TO-263-7 XL
E3M0160120J2	1200	160 mΩ	18	TO-263-7 XL
E3M0016120K	1200	16 mΩ	125	TO-247-4
E3M0021120K	1200	21 mΩ	104	TO-247-4
E3M0032120K	1200	32 mΩ	67	TO-247-4
E3M0040120K	1200	40 mΩ	57	TO-247-4
E3M0075120K	1200	75 mΩ	32	TO-247-4
E3M0160120K	1200	160 mΩ	17	TO-247-4

# OPTIMIZE DESIGN TO COST RATIO TO SCALE YOUR PLATFORMS QUICKLY

For advanced power circuit designs we offer SiC Bare Die MOSFETS and Schottky Diodes. For those who have a complex supply chain, or who prefer greater control over package development, our bare die devices offer the ultimate in system-level customization.

Our technical support team is eager to partner—no matter where you reside within the supply chain—to help you achieve greater system performance and enhance reliability.



**Need help getting started with Wolfspeed Bare Die? Check out these helpful resources:**

[Sintering considerations and the die top system](#)

[SiC MOSFET short circuit testing](#)



# BARE DIE SILICON CARBIDE MOSFETs

## BROAD PORTFOLIO OF SILICON CARBIDE BARE DIE MOSFETs FOR EFFICIENCY

Wolfspeed continues to lead in Silicon Carbide with our first Automotive 1200 V E-Series™ line of Bare Die Silicon Carbide (SiC) MOSFETs. The portfolio is fully automotive qualified, with high blocking voltage with the industry-leading low RDS(ON) over temperature stability, enabling low conduction losses and highest figures of merit in the most demanding applications. These devices are optimized for use in high power applications such as automotive drive trains, motor drives, solid state circuit breakers, resonant topologies, and more.

Based on latest generations, Wolfspeed's bare die SiC MOSFETs include a range of blocking voltage, on-resistance and package options that enable designers to select the right part for their application.

The MOSFETs are designed for low RDS(ON), are easy to parallel and compatible with standard gate drive design. The efficiency gained by moving from a silicon-based solution to Silicon Carbide can help reduce system size, weight, and cooling requirements.

A range of top side and back side metallization options and die layouts provide flexibility to module designers in choice of assembly process and module layout.



### FEATURES

High Blocking Voltage with Industry Leading Low RDS(on) Over Temperature Stability

Fast Intrinsic Diode with Low Reverse Recovery Charge ( $Q_{rr}$ )

High-Speed Switching with Low Output Capacitance

Low Conduction Losses Over Temperature

Avalanche Ruggedness



### BENEFITS

Supply Chain Flexibility

Improves System Efficiency with Lower Conduction Losses

Enables High Switching Frequency Operation

Improves System Level Power Density

Reduces System Size, Weight, and Cooling Requirements



### APPLICATIONS

Drivetrain

Fast Charging

Energy Storage

Solar

Motor Drive

UPS

Aerospace

	Part Number	Blocking Voltage (V)	$R_{DS(ON)}$ at 25°C	Current Rating (A)
Power Die Industrial Products	CPM3-0650-0015A	650	15	120
	CPM3-0650-0045A	650	45	49
	CPM3-0650-0060A	650	60	37
	CPM3-0900-0010A	900	10	194
	CPM3-0900-0030A	900	30	66
	CPM3-0900-0065A	900	65	32
	CPM3-1200-0013A	1200	13	149
	CPM3-1200-0016A	1200	16	112
	CPM3-1200-0021A	1200	21	100
	CPM4-0120-0149JS0A	1200	26	79
	CPM3-1200-0032A	1200	32	63
	CPM4-0120-0104JS0A	1200	42	55
	CPM3-1200-0075A	1200	75	30
	CPM3-1200-0160A	1200	160	17
	CPM3-1700-R020E	1700	20	120
	CPM3-3300-R050A	3300	52	52

	Part Number	Blocking Voltage (V)	$R_{DS(ON)}$ at 25°C	Current Rating (A)
Power Die Automotive products	EPM3-0750-0010D	750	10	178
	EPM3-1200-R013D	1200	13	160
	EPM3-1200-0014D1	1200	14	149
	EPM3-1200-R015D	1200	15	148
	EPM3-1200-0017D	1200	17	134
	EPM3-1200-0017D1	1200	17	134



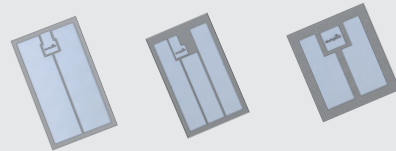
# BARE DIE SILICON CARBIDE SCHOTTKY DIODES

## WOLFSPEED® SILICON CARBIDE BARE DIE SCHOTTKY DIODES OFFER PROVEN RELIABILITY

Wolfspeed has the broadest portfolio of Silicon Carbide Schottky diodes, with more than twelve trillion field hours, lowest FIT rate, and 35 years of experience in Silicon Carbide offering customers proven reliability. Wolfspeed provides advanced design, extensive qualification, screening and parametric characterization resulting in the most reliable and robust devices on the market.

Our diodes feature the MPS (Merged PiN Schottky) design which is more robust and reliable than standard

Schottky barrier diodes. Pairing Wolfspeed Silicon Carbide diodes with Silicon Carbide MOSFETs creates a powerful combination of higher efficiency and reduced component pricing when purchased together.



### FEATURES

Zero Reverse Recovery

Zero Forward Recovery

High-Frequency Operation

Fast Switching



### BENEFITS

Higher Efficiency

Low Switching Loss

High Thermal Conductivity



### APPLICATIONS

EV Chargers

Industrial Power Supplies

Motor & Traction Drives

Solar & Energy Storage Systems

UPS

DC-DC Converters

	Part Number	Blocking Voltage (V)	Current Rating (A)	Total Capacitive Charge ( $Q_C$ (typ))
Power Die Industrial Products	CPW2-0650-S006B	650	6	15 nC
	CPW2-0650-S008B	650	8	20 nC
	CPW2-0650-S010B	650	10	24 nC
	CPW2-0650-S012B	650	12	34 nC
	CPW2-0650-S016B	650	16	44.5 nC
	CPW4-1200-S002B	1200	2	11 nC
	CPW4-1200-S005B	1200	5	27 nC
	CPW4-1200-S008B	1200	8	37 nC
	CPW4-1200-S010B	1200	10	52 nC
	CPW4-1200-S015B	1200	15	77.5 nC
	CPW4-1200-S020B	1200	20	99 nC
	CPW6-1200-Z050A	1200	50	279 nC
	CPW6-1700-Z005A	1700	5	79 nC
	CPW6-1700-Z010A	1700	10	126 nC
	CPW6-1700-Z025A	1700	25	325 nC
CPW6-1700-Z050A	1700	50	479 nC	

	Part Number	Blocking Voltage (V)	Current Rating (A)	Total Capacitive Charge ( $Q_C$ (typ))
Power Die Automotive products	EPW4-1200-S010A	1200	10	56 nC
	EPW4-1200-S020A	1200	20	99 nC

## DESIGN TOOLS

## START MODELING FOR YOUR DESIGN WITH SPEEDFIT™ DESIGN SIMULATOR

## WELCOME TO SPEEDFIT™ DESIGN SIMULATOR

Welcome to SpeedFit™ Design Simulator, the industry's most comprehensive system-level circuit simulator for Silicon Carbide power applications.

Accelerate the design process with simulation results you can trust. SpeedFit™ Design Simulator quickly calculates losses and estimates junction temperature for power devices based on lab data for common topologies ranging from simple buck and boost converters to a fully bi-directional totem pole PFC or resonant DC/DC converter.

## USING SPEEDFIT™ DESIGN SIMULATOR, YOU CAN QUICKLY DETERMINE:

- The right product for an application

---

- Comparative performance for different devices

---

- How the performance with varies Rg

---

- How many devices need to be paralleled

## KICKSTART YOUR DESIGN

## Choose your Application

Converter Type  
(AC-DC, DC-DC, DC-AC)

Select power topology



## Specify Input/Output and Select Device

Input voltage

---

Output voltage

---

Rated output power  $S_o$

---

Select the device from recommended products list

---

Number of devices to be paralleled

---

Adjust gate resistance



## Input Detailed Specifications

AC frequency  $F_{ac}$

---

Switching frequency  $F_{sw}$

---

Deadtime

---

Inductance

---

Capacitance

---

Other circuit parameters



## Input Thermal Management Specs

Cooling System

---

Thermal interface resistance  $R_{th,ch}$

---

Heatsink temperature  $T_h$

---

Thermal resistance  $R_{th,ha}$

---

Heatsink time constant  $t_{ha}$

---

Additional heat source on heatsink  $P_{add}$

---

Ambient temperature  $T_{amb}$



## Simulate

Comparative performance for different devices

---

Choose the right product for your application

EXPLORE SPEEDFIT™ DESIGN SIMULATOR AT [WOLFSPEED.COM/SPEEDFIT](https://www.wolfspeed.com/speedfit)

## EVALUATION KITS

Wolfspeed understands that system designers want to perform characterization in their own labs when working with a new product. To help reduce design resource investment and enable fast characterization of our products, Wolfspeed offers a wide array of Evaluation Kits to help you better understand the capability of our Silicon Carbide discrete and module packages.

Wolfspeed partners with component manufacturers to provide our customers with access to the widest selection of and the latest system components. Our Partner Evaluation Kits are developed and supported by our partners in collaboration with Wolfspeed.

	Name*	Topology	Package	SKU
DISCRETE PACKAGES	SpeedVal™ Kit Modular Evaluation Platform	Dynamic Characterization	TO-247-4, TO-263-7, TOLL	SpeedVal™ Kit
	SpeedVal™ Kit Modular Evaluation Platform Three-Phase Motherboard	3-Phase Inverter	TO-247-4, TO-247-3, TO-263-7, TOLL	MOD-MB-3P-0900V-40A
MODULE PLATFORMS	Dynamic Characterization Evaluation Tool Optimized for the 62 mm (BM) Module Platform	Dynamic Characterization	B platform	KIT-CRD-CIL12N-BM3 KIT-CRD-CIL17N-BM3
	Dynamic Characterization Evaluation Tool Optimized for the Wolfspeed WolfPACK™ Half Bridge Module Platform	Dynamic Characterization	F platform	KIT-CRD-CIL12N-FMA
	Dynamic Characterization Evaluation Tool Optimized for the Wolfspeed WolfPACK™, Six-Pack Platform	Dynamic Characterization	F platform	KIT-CRD-CIL12N-FMC
	Dynamic Characterization Evaluation Tool Optimized for the Wolfspeed WolfPACK™ GM3 Half Bridge Module Platform	Dynamic Characterization	G platform	KIT-CRD-CIL12N-GMA
	Dynamic Characterization Evaluation Tool Optimized for the HM High Performance 62 mm (HM) Module Platform	Dynamic Characterization	H platform	KIT-CRD-CIL12N-HM3 KIT-CRD-CIL17N-HM3
	Dynamic Performance Evaluation Board for the Wolfspeed WolfPACK™ Full-Bridge Module Platform	Dynamic Characterization	F platform	KIT-CRD-CIL12N-FMB
	Evaluation Tool for the XM3 Module Platform	AC to DC, Dynamic Characterization	X platform	KIT-CRD-CIL12N-XM3 KIT-CRD-CIL17N-XM3
	Dynamic Characterization Evaluation Tool Optimized for the Wolfspeed DM Half Bridge Module Platform	Dynamic Characterization	D platform	KIT-CRD-CIL12N-DM

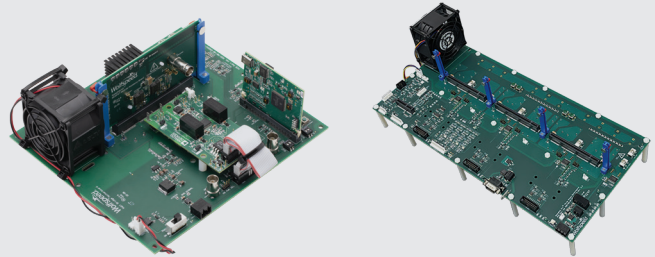
\*All of these Evaluation kits are designed by Wolfspeed

TO LEARN MORE, VISIT US AT [WOLFSPEED.COM/POWER](https://www.wolfspeed.com/power)

# SPEEDVAL™ KIT MODULAR EVALUATION PLATFORM

## THE INDUSTRY'S MOST VERSATILE SiC MODULAR EVALUATION PLATFORM

Wolfspeed's SpeedVal™ Kit Modular Evaluation Platform enables rapid testing of silicon carbide devices at real operating conditions with a flexible set of building blocks for in-circuit evaluation of system performance. Quickly evaluate and optimize the high-speed dynamic switching performance of Wolfspeed SiC MOSFETs paired with your choice of optional control cards, accessories and gate drivers from industry-leading partners.



### FEATURES

Multiple Configurations

Quickly Swap Devices for Testing

Verified Compatible Components

Buck/Boost up to 15 kW

3-Phase Inverter up to 30 kW

Test 650 V – 1200 V Devices



### BENEFITS

Starting Point for Firmware Development

Comprehensive Design Kit

Functional Blocks as Design Starting Points

Flexible Platform for Quick Evaluation of Multiple Device Choices



### USES

Single and 3-Phase Inverter

Switching Loss Measurement

Gate Driver Evaluation

Thermal Testing

Buck/Boost Operation

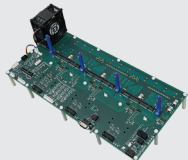
## Explore the Options

The platform consists of a motherboard, power daughter cards, partner gate driver cards and optional control cards, and accessories.

Components may be purchased separately or use the SpeedVal™ Kit Configurator to build your complete evaluation system.



Half-Bridge Motherboard



3-Phase Motherboard



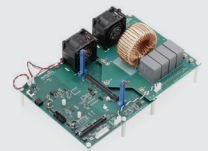
Power Daughter Cards



Gate Driver Cards



Control Cards (optional)



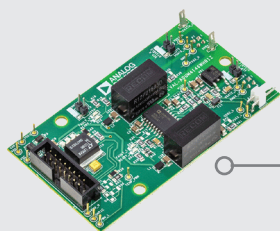
Accessories (optional)

TO LEARN MORE, VISIT US AT [WOLFSPEED.COM/SPEEDVALKIT](https://www.wolfspeed.com/speedvalkit)

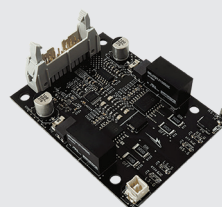
## GATE DRIVER BOARDS

Wolfspeed provides companion gate driver evaluation tools for its Silicon Carbide products to help you get up and running quickly. These evaluation tools help you learn best practices and give you a starting point for working with

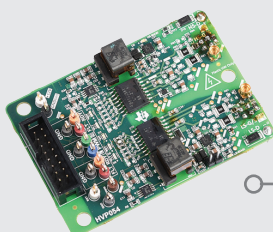
Wolfspeed's Silicon Carbide. All design files available are complimentary, so that you can quickly understand and implement our designs into your end-system and modify as-needed to fit your specific design requirements.



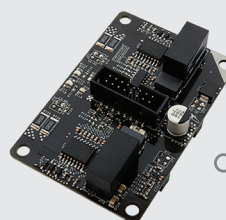
ADuM4146



CGD1200HBP-BM2  
CGD1200HBP-BM3



UCC21750 & UCC21710



CGD12HBXMP

### COMPANION GATE DRIVERS

SKU	Package	Designed By	Gate Driver	Output Channels
CGD1200HB2P-BM2	B Platform	Wolfspeed	Analog Devices® ADuM4135	2
CGD1200HB2P-BM3	B Platform	Wolfspeed	Analog Devices ADuM4135	2
CGD1700HB2P-BM2	B Platform	Wolfspeed	ADuM4136	2
CG1700HB2P-BM3	B Platform	Wolfspeed	ADuM4136	2
CGD1700HB3P-HM3	H Platform	Wolfspeed	IXDD614YY	2
UCC21750QDWEVM-054	SpeedVal™ Kit	Texas Instruments	Texas Instruments® UCC21750	2
CGD1700HB2M-UNA / UCC21710QDWEVM-054	SpeedVal™ Kit, F Platform, G Platform	Texas Instruments	Wolfspeed / Texas Instruments UCC21710	2
EVAL-ADUM4146WHB1Z	SpeedVal™ Kit, F Platform, G Platform	Analog Devices	Analog Devices ADuM4146	2
EVAL-ADUM4122WHB1Z	SpeedVal™ Kit, F Platform, G Platform	Analog Devices	Analog Devices ADuM4122	2
EVAL-ADUM4121WHB1Z	SpeedVal™ Kit, F Platform, G Platform	Analog Devices	Analog Devices ADuM4121	2
Si823H-ACWA-KIT Si823H-AAWA-KIT Si823H-ABWA-KIT	SpeedVal™ Kit, F Platform, G Platform	Skyworks	Skyworks® Si823Hx	2
CGD12HBXMP	X Platform	Wolfspeed	Analog Devices ADuM4135	2
UCC5880QEVM-057	X Platform	TI	Texas Instruments® UCC5880Q1	2
UCC5880INVERTEREVM	X Platform	TI	Texas Instruments® UCC5880-Q1	2
CGD1700HB2P-XM3	X Platform	Wolfspeed	ADuM4136	2
FRDMGD3160XM3EVM	X Platform	NXP	NXP® GD3160	2

## Reference Designs

Wolfspeed offers time-saving Reference Designs for some of the most in-demand Silicon Carbide devices in power systems – Inverters, power converters, chargers and many more. These Reference Designs come complete with application notes, user guides and design files to allow designers to create rugged and reliable systems with best-in-class power density, performance and efficiency.

Wolfspeed partners with experts in system integration to offer a wider selection of applications and power topologies built with the latest components. Our Partner Reference Designs are developed and supported by our partners in collaboration with Wolfspeed. Hardware Design Files, System and Mechanical Design Files, and Firmware are available with these reference designs.

### Wide Input Voltage Range (300 VDC – 1200 VDC) 15 W Flyback Auxiliary Power Supply Board

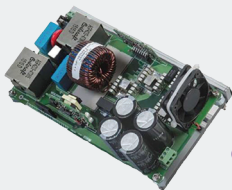


**Topology:**  
AC to DC, DC to DC  
**Package:**  
TO-263-7  
**CRD-15DD17P**

#### Specifications:

- Demonstration of the efficient operation of Wolfspeed's 1700 V, 1 $\Omega$  Silicon Carbide MOSFET with an availability of high blocking voltage and high creepage distance (~7 mm)
- Wolfspeed's 15 W flyback auxiliary power supply board can accept a wide range of AC or DC input voltage (480 VAC – 530 VAC) or (300 VDC–1200 VDC) and provide 12 VDC at the output with an exceptional efficiency of 85%
- Simple control approach has been utilized to reduce the overall complexity and cost of the system
- High-frequency operation of Wolfspeed's 1700 V, 1  $\Omega$  Silicon Carbide MOSFET helps in reducing form factor of the board significantly

### 2.2 kW High Efficiency (80 Plus® Titanium) Bridgeless Totem-Pole PFC with Silicon Carbide MOSFET



**CRD-02AD065N**

Highly efficient and low cost solution of 2.2 kW bridgeless totem-pole PFC topology based on Wolfspeed's latest (C3M™) 650 V 60 m $\Omega$  Silicon Carbide MOSFETs. Comfortably achieve Titanium standard by having > 98.5% efficiency while THD < 4% under all load conditions.

#### Specifications:

- Input voltage range: 47 - 63 Hz 180 - 264 V (rms)
- Output voltage 385 V nominal +/- 5%
- Output power: 2.2 kW at 230 V AC, 1.5 kW (limited by thermal) at 180 V AC
- Input power factor > 0.98 and input THD <5% (of fundamental) at full load
- Switching frequency: 64 kHz
- Efficiency at 50% load > 98.5%
- Max ambient operating temperature 50 °C
- Cooling: Forced air, 15 x 40 mm fan
- Topology: Totem-Pole PFC with diodes for low-frequency leg
- Power devices package: TO-247-3, TO-247-4, and TO-263-7

## 3.6 kW Bridgeless Totem-Pole PFC

**Topology:**

AC to DC

**Package:**

TOLL, TO-247-3

CRD-03600AD065E-L

This reference design demonstrates the application of Wolfspeed's C3M™ 650 V Silicon Carbide MOSFET Technology in TOLL (TO – Leadless) Package to create a 3.6 kW bridgeless totem-pole PFC for server power supply, data center power supply, mining power supply, and telecom systems.

**Specifications:**

- Applications: 80 Plus® Platinum/Titanium, Energy Star®, Lot 9, and OCP3.0 power supplies
- Power density: 92 W/in<sup>3</sup>
- Switching frequency: 60 kHz
- Input voltage: 180 - 305 VAC
- Output voltage: 440 VDC MAX
- Output Power: 3.6 kW (Derated at low line)
- Peak efficiency: 99%
- Cooling: Forced air

## 6.6 kW Bi-Directional EV On-Board Charger

**Topology:**

AC to DC, DC to AC

**Package:**

TO-247-4

CRD-06600FF10N

**Specifications:**

- Demonstration of 1000 V; 65 mΩ C3M™ and E3M Silicon Carbide MOSFET in a 6.6 kW Bi-Directional EV On-Board Charger

- 6.6 kW Bi-Directional EV On-Board Charger demo board consist of a Bi-Directional Totem-Pole PFC (AC/DC) stage and an Isolated Bi-Directional DC/DC stage based on CLLC topology with a variable DC Link Voltage
- Wolfspeed's 6.6 kW Bi-Directional EV On-Board Charger demo board can accept 90 VAC-265 VAC as an input and provide 250 VDC-450 VDC at the output with > 96% of efficiency in both charging and inversion modes

## 6.6 kW High Power Density Bi-Directional EV On-Board Charger

**Topology:**

AC to DC, DC to AC

**Package:**

TO-247-4

CRD-06600FF065N-K

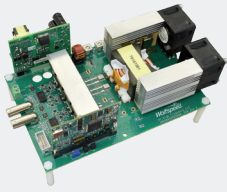
This reference design is offered as a comprehensive design package which can be used as a starting point for new Silicon Carbide designs.

The design accomplishes a peak efficiency of 96.5% and a power density of 53 W/in<sup>3</sup> or 3 kW/L.

**Specifications:**

- Universal single phase input voltage: 90 V - 265 V AC
- Output voltage: 250 V - 450 V DC
- Output current in charging mode: 18 A
- AC/DC topology: CCM Totem-Pole PFC operating at 67 kHz
- DC/DC topology: Bi-directional CLLC resonant converter operating at 148 - 300 kHz
- Control modes: A combination of constant current, constant voltage and constant power mode
- Unique integrated heatsink design removes heat from MOSFETs, transformer and inductors
- CAN interface

## 6.6 kW High Frequency DC-DC Converter



**Topology:**

DC to DC

**Package:**

TO-247-3

CRD-06600DD065N

**Specifications:**

- Input voltage: 380 - 420 VDC
- Output voltage: 400 VDC
- Max current: 16.5 A
- Output power: 6.6 kW
- Switching frequency: 500 kHz - 1 MHz
- Closed loop control for regulated output
- Optional external PWM inputs for open loop testing

## 7.5 kW FM3 Three-Phase Motor Drive



**Topology:**

AC to DC, DC to AC

**Package:**

FM3

CRD07500AA12N-FMC

**Specifications:**

- Output power of 7.5 kW
- Switching frequency of 100 kHz
- Input/output voltage of 480 VAC

## 11 kW High Efficiency Three-Phase Motor Drive Inverter



**Topology:**

DC to AC

**Package:**

TO-247-4, TO-263-7

CRD-11DA12N-K

**Specifications:**

- Input Voltage: 550 – 850 VDC
- Switching Frequency: 16 – 32 kHz
- Nominal RMS Output Voltage: 380 VL-L
- Output Power: 11 kW
- Short circuit protection
- Bus derived auxiliary power supply
- Open loop mode for static testing
- Sensorless FOC for permanent magnet synchronous machine (PMSM)
- CAN interface to PC based user interface

## 20 kW High Efficiency Three-Phase Motor Drive Inverter



**Topology:**

DC to AC

**Package:**

TO-247-4, TO-263-7

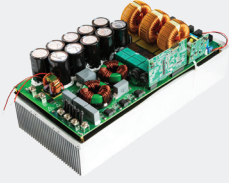
CRD-20DA12N-K

**Specifications:**

- Input Voltage: 550 – 850 VDC
- Switching Frequency: 16 – 32 kHz
- Nominal RMS Output Voltage: 380 VL-L
- Output Power: 20 kW
- Short circuit protection
- Bus derived auxiliary power supply
- Open loop mode for static testing
- Sensorless FOC for permanent magnet synchronous machine (PMSM)
- CAN interface to PC based user interface



## 22 kW Bi-directional High Efficiency Active Front End (AFE) Converter



### Topology:

AC to DC

### Package:

TO-247-4

CRD-22AD12N

This reference design demonstrates the application of Wolfspeed's 1200 V C3M™ and E3M SiC MOSFETs to create a 22 kW three phase bidirectional active front end (AFE) converter for electric vehicle (EV) on-board charger (OBC); off-board fast charging; and other industrial applications such as energy storage systems and three phase PFC power supplies.

### Specifications:

- Switching frequency: 45 kHz
- Tooled heatsink to simulate cooling plate
- CAN interface

#### PFC Mode

- Maximum input current: 32 A

#### Three Phase Input

- Input voltage: 305 Vrms - 450 Vrms line-line, 50/60 Hz
- Output DC voltage: 650 V - 900 V
- Maximum power: 22 kW

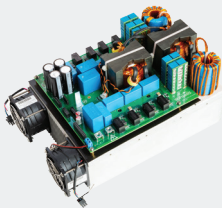
#### Single phase input

- Input voltage: 180 Vrms - 264 Vrms, 50/60 Hz
- Output DC voltage: 380 V - 900 V
- Maximum power: 6.6 kW

#### Inverter Mode

- DC input voltage: 350 V - 760 V DC
- Maximum current: 20 A
- AC output voltage: 230 Vrms, 50 Hz single phase
- Maximum power: 6.6 kW

## 22 kW Bi-directional High Efficiency DC/DC Converter



### Topology:

DC to DC

### Package:

TO-247-4

CRD-22DD12N

The design accomplishes a peak efficiency of 98.5% in both charging and discharging mode and a power density of 8 kW/L. This reference design is offered as a comprehensive design package which can be used as a starting point for new Silicon Carbide designs.

### Specifications:

- Full bridge CLLC resonant converter operating at 135-250 kHz
- Tooled heatsink to simulate cooling plate
- CAN interface

#### Charging Mode

- Input voltage: 380 V - 900 V DC
- Output voltage: 480 V - 800 V DC Nominal. System capable of 200 V - 800 V DC
- At  $V_{in} = 650\text{ V} - 900\text{ V DC}$ , output power: 22 kW, output current: 36 A
- At  $V_{in} = 380\text{ V} - 900\text{ V DC}$ , output power: 6.6 kW, output current: 26.4 A

#### Discharging Mode

- Input voltage: 300 V - 800 V DC
- Output voltage: 360 V - 750 V DC Nominal
- Output power: 6.6 kW
- Output current : 19 A

## 25 kW FM3 Three-Phase Inverter



### Topology:

DC to AC

### Package:

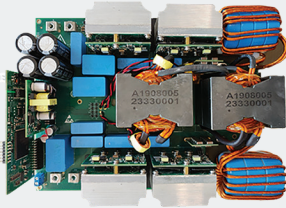
FM3

CRD25DA12N-FMC

### Specifications:

- Output power of 25 kW
- Switching frequency of 100 kHz
- Input voltage of 1000 VDC

## 22 kW Bi-Directional CLLC Utilizing IMS Board



**Topology:**  
DC to DC

**Package:**  
TO-263-7

**CRD-22DD12N-J2**

This reference design demonstrates the application of Wolfspeed's automotive qualified E3M 1200V SiC MOSFETs in a TO-263-7 (J2) surface mount package to create a 22 kW Bi-Directional High Efficiency DC/DC Converter based on insulated metal substrate (IMS) board for electric vehicle (EV) on-board charger (OBC) and similar applications. The AEC-Q101 compliant E3M™ series MOSFETs are ideally suited for the most challenging on-board applications.

### Specifications:

- Product: E3M0032120J2
- Full bridge CLLC resonant converter operating at 135 - 250 kHz
- Tooled heatsink to simulate cooling plate
- CAN interface

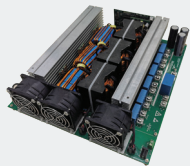
### Charging Mode

- Input Voltage: 380 V – 900 V DC
- Output Voltage: 480 V - 800 V DC Nominal System capable of 200 V-800 V DC
- At  $V_{in} = 650\text{ V} - 900\text{ V DC}$ , Output Power : 22 kW ; Output current : 36 A
- At  $V_{in} = 380\text{ V} - 900\text{ V DC}$ , Output Power : 6.6 kW ; Output current : 26.4 A

### Discharging Mode

- Input Voltage: 300 V – 800 V DC
- Output Voltage : 360 V – 750 V DC Nominal
- Output Power : 6.6 kW ; Output current : 19 A

## 30 kW Discrete Interleaved LLC DC-DC Converter



**Topology:**  
DC to DC

**Package:**  
TO-247-4, TO-220-2, TO 247-3

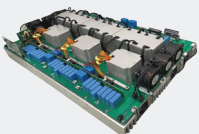
**CRD30DD12N-K**

This reference design targets high-power-density, high-efficiency fast charger applications and features Wolfspeed's discrete 1200 V C3M Silicon Carbide MOSFETs and 650 V C6D Silicon Carbide Schottky Diodes. A 3-phase interleaved LLC topology is implemented to provide low input current ripple and high efficiency for EV high power fast charger.

### Specifications:

- Output Voltage 200 V – 1000 V
- Power Density of 6.5 kW/L
- Peak Efficiencies over 98.3%
- Adaptive Control 130 kHz – 250 kHz Switching Frequency
- Series Output Configuration
  - Input Voltage: 650 V - 850 V DC
  - Output Voltage:
    - 500 V - 1000 V DC, 50 A max, 30 kW max
- Parallel Output Configuration
  - Input Voltage: 650 V - 850 V DC
  - Output Voltage:
    - 200 V - 250 V DC, 66 A max
    - 250 V - 500 V DC, 100 A max, 30 kW max

## 60 kW Interleaved LLC Converter



**Topology:**  
DC to DC

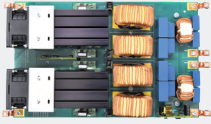
**Package:**  
TO-247-4

**CRD-60DD12N-K**

### Specifications:

- The 60 kW 3-phase interleaved LLC DC-DC converter is targeted to provide high power density, low input current ripple and high efficiency for EV DC fast chargers.
- Features Wolfspeed's discrete 1200 V C3M™ Silicon Carbide MOSFETs (C3M0040120K or C3M0032120K) and 650 V C6D Silicon Carbide Schottky diodes (C6D20065D).
- A wide output voltage range of 200 V - 1000 V to accommodate all levels of EV charging.
- A high power density of 4.83 kW/L and higher than 98.5% peak efficiency.
- Adaptive control operates over a 120 kHz - 250 kHz switching frequency range to maintain optimal control over all operating conditions.

## 60 kW Interleaved Boost Converter

**Topology:**

DC to DC

**Package:**

TO-247-4

CRD-60DD12N

**Specifications:**

- This reference design demonstrates the application of Wolfspeed's C3M™ and E3M Silicon Carbide MOSFETs in a 4-phase interleaved boost converter. The design uses parallel Silicon Carbide

MOSFETs and parallel Silicon Carbide Schottky diodes to achieve a high-power density using discrete devices

- 60 kW Interleaved Boost Converter demo board is based on four 15 kW Interleaved Boost Stages and each stage is using Wolfspeed's C3M™ CGD15SG00D2 isolated Gate Driver Board
- Wolfspeed's 60 kW Interleaved Boost Converter demo board can accept 470 VDC - 800 VDC as an input and provide 850 VDC at the output with a peak efficiency of 99.5% and a power density of 127W/in<sup>3</sup>

## 300 kW, 250 kW & 200 kW Three-Phase Inverter

**Topology:**

AC to DC, DC to AC

**Package:**

X Platform

CRD200DA12E-XM3

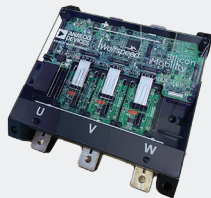
CRD250DA12E-XM3

CRD300DA12E-XM3

**Specifications:**

- 800 VDC bus nominal (900 V max)
- 360/300/240 A<sub>RMS</sub> output
- 80 kHz maximum switching frequency
- 300 uF DC link capacitance
- Liquid cooled cold plate
- CAN interface

## 300 kW Three-Phase Traction Inverter

**Topology:**

DC to AC

**Package:**

XM3

ERD300DA12SA-XM3

**Specifications:**

- 800VDC bus nominal (900 V max)
- 360 ARMS output
- 80 kHz maximum control and switching frequency
- 300 uF DC link capacitance
- Liquid cooled cold plate
- CAN interface

## 600 kW High Performance Dual Three-Phase Inverter

**Topology:**

AC to DC, DC to AC

**Package:**

X Platform

CRD600DA12E-XM3

**Specifications:**

- DC Bus voltage: 800 V nominal, 900 V maximum
- Switching frequency: 80 kHz maximum
- DC Link capacitance: 600 µF
- Double-sided liquid cold plate
- CAN interface
- Single Bridge Operation- 360 A<sub>rms</sub> output current
- Parallel Bridge Operation -720 A<sub>rms</sub> output current

Optimized for Wolfspeed's all Silicon Carbide, Low Inductance, Conduction Optimized XM3 Power Module. Complete Stackup, including: Modules, Cooling, Bussing, Gate Drivers, Voltage / Current Sensors, and Controller.



The Power To  
**MAKE IT REAL**

**NOBODY KNOWS SILICON CARBIDE POWER DEVICES LIKE WOLFSPEED.**

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