Wolfspeed®

POWER CATALOG

POWER PRODUCTS

Transforming Power with
INDUSTRY-LEADING SILICON CARBIDE EXPERTISE & CAPACITY

NEW

WELCOME TO WOLFSPEED

Wolfspeed is the foremost manufacturer of Silicon Carbide Bare Die Schottky Diodes and MOSFETs, Discrete Schottky Diodes and MOSFETs, and Power Modules that put increased efficiency, higher switching frequency and reduced system size and costs in the hands of designers everywhere.

AND WE DIDN'T BECOME THE LEADER IN WIDE BANDGAP SEMICONDUCTORS OVERNIGHT.

Wolfspeed spent more than 30 years establishing a global brand known for innovation, financial strength and reliable materials sourcing, staffed by the most forward-looking thinkers and doers in any scientific enterprise.

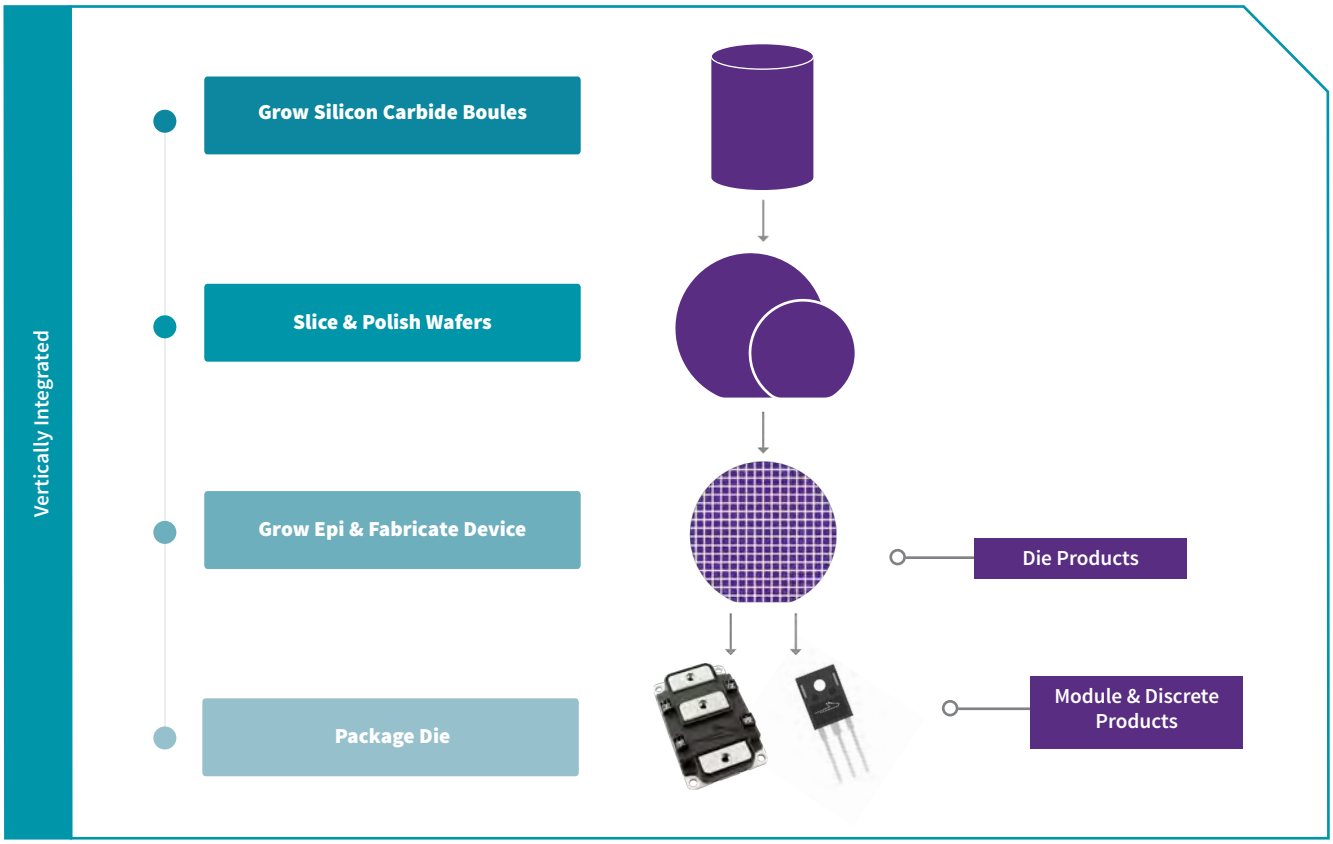
Wolfspeed was born ready, and we're outpacing the competition in every meaningful performance and cost-benefit parameter to provide RF and Power devices to any industry that needs the fastest, smallest, lightest and most efficient semiconductor products available. Which is all of them.

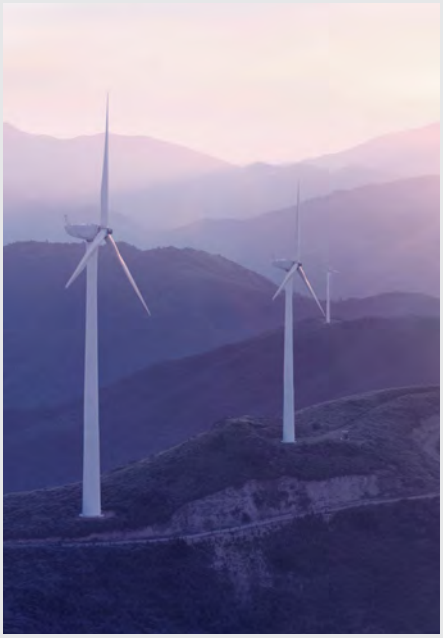
7,000,000,000,000+ HOURS IN THE FIELD. AND COUNTING.

Silicon Carbide has powered Wolfspeed's Bare Die Schottky Diodes and MOSFETs, Discrete Schottky Diodes and MOSFETs, and Power Modules for more than seven trillion hours of end-customer usage worldwide.

THE WORLD LEADER IN SILICON CARBIDE.

WOLFSPEED IS YOUR TRUSTED VERTICALLY-INTEGRATED SILICON CARBIDE MANUFACTURER





WE UNLEASH THE POWER OF POSSIBILITIES THROUGH HARD WORK, COLLABORATION AND A PASSION FOR INNOVATION

As a vertically integrated company, Wolfspeed owns all steps in the Silicon Carbide production process, allowing us to push the technology forward quickly. Our founders pioneered Silicon Carbide and GaN solutions for both High Power and RF applications, and Wolfspeed remains the sole vertically integrated manufacturer for both industry sectors.

Wolfspeed was the first to commercialize the Silicon Carbide MOSFET and has the world's largest install base of Silicon Carbide devices. With a best-in-class failure-in-time (FIT) rate, Wolfspeed is consistently in the single digits at 5-per-billion device hours, illustrating the industry-leading reliability and performance of the company's Silicon Carbide devices.

BECAUSE WE INNOVATE AT EVERY STAGE, WE'RE ABLE TO DO THINGS OTHER COMPANIES CAN'T

Pages 5-6

POWER BARE DIE PRODUCTS

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

Pages 7-15

DISCRETE POWER DEVICES

Discrete devices for broad applications across automotive, industrial and energy

Pages 16-21

POWER MODULES

Power modules for high power applications in automotive, industrial, and energy

OUR STRENGTHS

WORKING CLOSELY WITH CUSTOMERS
TO ENABLE NEW PRODUCTS WITH INCREASING ADOPTION OF SILICON CARBIDE

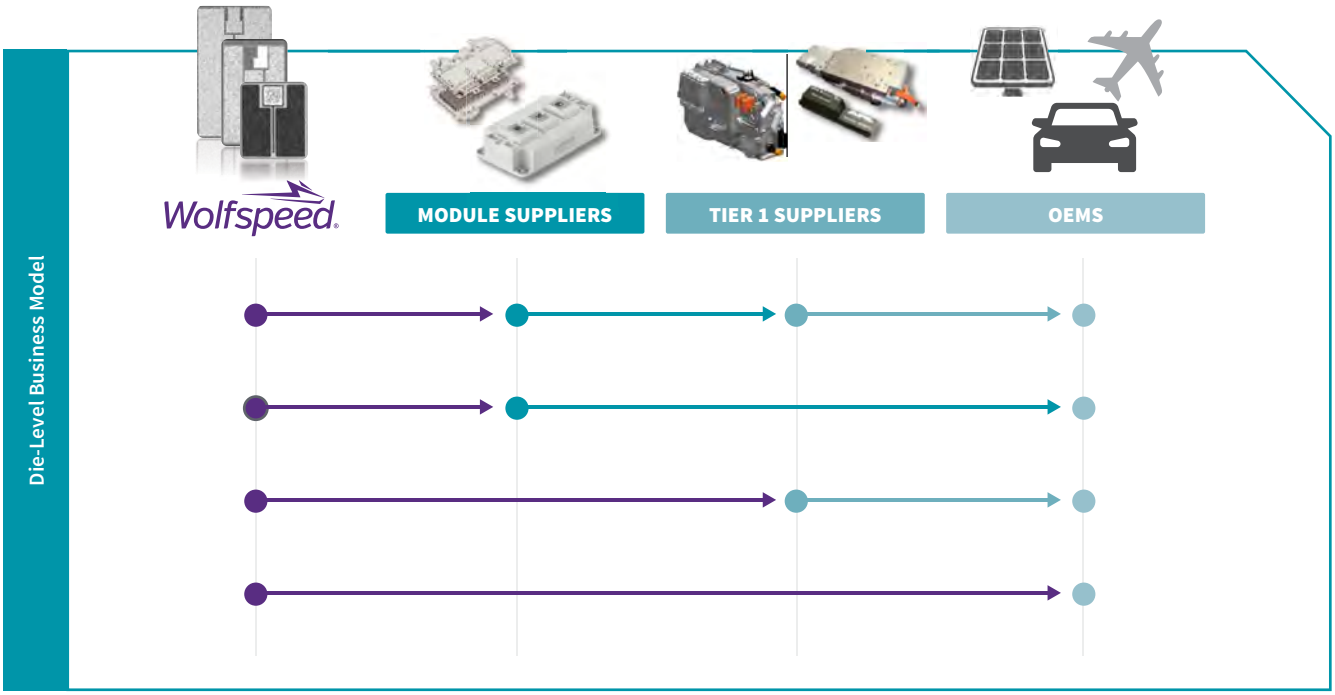
UTILIZE RAPID LEARNING CYCLES
TO CREATE DEVICES AND DRIVE SIGNIFICANT IMPROVEMENTS IN QUALITY AND MANUFACTURING

QUALITY
END-TO-END MANUFACTURING

ABOUT BARE DIE

Wolfspeed has the broadest portfolio of Silicon Carbide (SiC) Bare Die MOSFETs and Schottky diodes on the market

Wolfspeed power bare die technology enables a broad array of technology and system solutions for the market. Wolfspeed power die team is engaged with the best module vendors, tier one suppliers, and OEM providers across the globe. This close interaction allows for the best outcome in innovation, technology and systems. Customers gain supply chain flexibility and insurance of supply that enable them to develop their systems with multiple solutions across multiple applications.



Unleashing the Power of Possibilities™

Wolfspeed has the broadest portfolio of Silicon Carbide (SiC) Bare Die MOSFETs and Schottky diodes, with more than seven trillion field hours, lowest FIT rate, and 30+ years of experience in Silicon Carbide. Wolfspeed provides advanced design, extensive qualification, screening and parametric characterization resulting in the most reliable and robust devices on the market.

Learn more at wolfspeed.com

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 the latest 3rd generation technology, Wolfspeed's 1200 V Bare Die SiC MOSFETs include a range of on-resistance and package options that enable designers to select the right part for their application.

The 1200 V 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 (Qrr)
- 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	Die Size (mm²)	Status
Power Die Industrial Products	CPM3-0650-0015A	650	15	18	Released
	CPM3-0650-0045A	650	45	6	Released
	CPM3-0650-0060A	650	60	5	Released
	CPM3-1200-0013A	1200	13	32	Released
	CPM3-1200-0016A	1200	16	26	Released
	CPM3-1200-0021A	1200	21	20	Released
	CPM3-1200-0032A	1200	32	15	Released
	CPM3-1200-0075A	1200	75	7	Released
	CPM3-1200-0160A	1200	160	4	Coming Soon
	CPM3-1700-R020E	1700	20	32	Released
	HPM3-3300-R050A	3300	50	37	Coming Soon

	Part Number	Blocking Voltage (V)	$R_{DS(ON)}$ at 25°C	Die Size (mm²)	Status
Power Die Automotive products	EPM3-0750-0010D	750	10	25	Released
	EPM3-1200-0017C	1200	17	25	Released
	EPM3-1200-0017D	1200	17	25	Released
	EPM3-1200-0017D1	1200	17	25	Released

ABOUT DISCRETES

Wolfspeed has the broadest portfolio of Silicon Carbide (SiC) MOSFETs and Schottky diodes

Wolfspeed has the broadest portfolio of Silicon Carbide (SiC) MOSFETs and Schottky diodes enabling power applications across automotive, renewable energy, power supply, and industrial.

Wolfspeed's Silicon Carbide MOSFETs enable higher switching frequencies, lower conduction losses, higher blocking voltages and avalanche capability, and reduce the size of components like inductors, capacitors, filters and transformers. We established a new benchmark for energy-efficient power switches when we commercialized the industry's first fully-qualified Silicon Carbide MOSFET in 2011, and we have been perfecting the technology ever since.

Wolfspeed has more than seven trillion field hours, lowest FIT rate, and 30+ years of experience in Silicon Carbide. Designing with both Wolfspeed Silicon Carbide diodes and MOSFETs creates a powerful, cost-effective approach to reaching higher efficiency performance.

WOLFSPEED DISCRETE POWER | PACKAGE GUIDE

MOSFETs

D	K	K1	J	J1	L	P
						
TO-247-3 Std. Package	**TO-247-4** Kelvin Lead	**TO-247-4 LP** Kelvin Lead Low Profile *coming soon*	**TO-263-7** Small Drain Footprint	**TO-263-7 XL** Larger Drain Footprint	**TOLL** TO-Lead Less *coming soon*	**TO-247-4 PLUS** Kelvin Lead

Schottky Diodes

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

WOLFSPEED DISCRETE POWER | DEVICE NOMENCLATURE GUIDE

Example: C3M0060065D

MOSFETs

C	3	M	0060	065	D
-	-	-	----	---	--
Qualification Grade	Product Series	Device Type	Typ Rdson @ 25C	Voltage Rating	Package
C = industrial E = automotive	3 = 3rd gen 2 = 2nd gen …	M = MOSFET	Ex = 0060 = 60mΩ	Ex = 065 = 650 V	D = TO-247-3 K1 = TO-247-4-LP K = TO-247-4 J = TO-263-7 J1 = TO-263-7-XL L = TOLL P = TO-247-4-PLUS

Example: E4D20120D

Schottky Diodes

E	4	D	20	120	D
-	-	-	----	---	--
Qualification Grade	Product Series	Device Type	Current Rating	Voltage Rating	Package
C = industrial E = automotive	2 = 2nd gen 3 = 3rd gen 4 = 4th gen …	D = Diode	Ex = 20 = 20A	Ex = 120 = 1200 V	A = TO-220-2 D = TO-247-3 D1 = TO-247-3 E = TO-252-2 F = TO-220-2 G = TO-263-2 H = TO-247-2 I = TO-220-2 Q = QFN 8X8

650 V SILICON CARBIDE MOSFETs

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

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

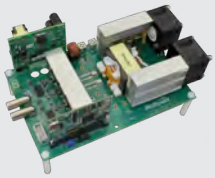
The 650 V MOSFET product family is ideal for applications including high performance industrial power supplies, server/telecom power, electric vehicle charging systems, energy storage systems, uninterruptible power supplies, and battery management systems.

FEATURED DESIGN TOOLS

2.2kW High Efficiency

(80+ Titanium) Bridgeless Totem-Pole PFC

CRD-02AD065N

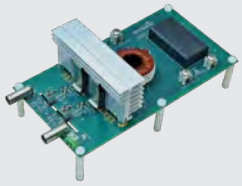


6.6kW High Frequency DC-DC Converter

CRD-06600DD065N

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

CRD-06600FF065N



Buck-Boost Evaluation Kit for Wolfspeed 650 V Silicon Carbide MOSFETs

KIT-CRD-3DD065P

FEATURES

- Low $R_{DS(ON)}$ over Temperature
- Low Device Capacitances
- Kelvin Source Pin
- High Temperature Operation (T_J = 175°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

- Industrial Power Supplies
- Server/Telecom
- EV-Charging Systems
- Energy Storage Systems (ESS)
- Uninterruptible Power Supplies (UPS)
- Battery Management Systems (BMS)

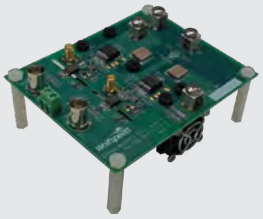
Part Number	Blocking Voltage (V)	$R_{DS(ON)}$ at 25°C	Current Rating at 25°C (A)	Package
C3M0015065D	650	15 mΩ	120	TO-247-3
C3M0015065K	650	15 mΩ	120	TO-247-4
C3M0025065D	650	25 mΩ	97	TO-247-3
C3M0025065J1	650	25 mΩ	80	TO-263-7
C3M0025065K	650	25 mΩ	97	TO-247-4
C3M0045065D	650	45 mΩ	49	TO-247-3
C3M0045065J1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

900 V SILICON CARBIDE MOSFETs

WOLFSPEED SILICON CARBIDE SOLUTIONS FOR **FAST SWITCHING POWER DEVICES**

Wolfspeed's 900 V Silicon Carbide MOSFETs offer low inductance in low inductance discrete packages with wide creepage and clearance distance between drain and source (~8mm). These MOSFETs take advantage of the high-frequency capability of the latest technology chips while providing extra electrical isolation suitable for high pollution environments. The separate Kelvin source pin reduces inductance, which reduces switching losses by as much as 30%. Designers can reduce component-count by moving from silicon-based, three-level topologies to simpler two-level topologies made possible by the improved switching performance.

FEATURED DESIGN TOOLS



Evaluation Board for 900 V Silicon Carbide C3M MOSFET in a 7-pin D2PAK (TO-263-7L)
KIT-CRD-8FF90P

FEATURES

- Low $R_{DS(ON)}$ over Temperature
- Low-impedance package
- Fast intrinsic diode with low reverse recovery (Qrr)
- Kelvin source pin

BENEFITS

- Improves system efficiency with lower conduction losses
- Enables high switching frequency operation
- Reduces system size, weight, and cooling requirements
- Enables new hard switching topologies (Totem-Pole PFC)

APPLICATIONS

- Motor Drive
- EV Charging Systems
- Uninterruptible Power Supply (UPS)
- Battery management systems
- Fast EV-Charging Systems
- Welding

Part Number	Blocking Voltage (V)	$R_{DS(ON)}$ at 25°C	Current Rating at 25°C (A)	Package
C3M0030090K	900	30 mΩ	63	TO-247-4
C3M0065090D	900	65 mΩ	36	TO-247-3
C3M0065090J	900	65 mΩ	35	TO-263-7
C3M0120090D	900	120 mΩ	23	TO-247-3
C3M0120090J	900	120 mΩ	22	TO-263-7
E3M0120090J	900	120 mΩ	22	TO-263-7
C3M0280090D	900	280 mΩ	11.5	TO-247-3
C3M0280090J	900	280 mΩ	11.5	TO-263-7

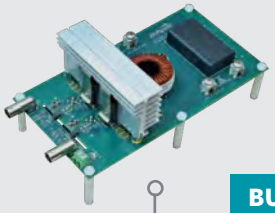
1000 V SILICON CARBIDE MOSFETs

WOLFSPEED SILICON CARBIDE SOLUTIONS FOR **FAST SWITCHING POWER DEVICES**

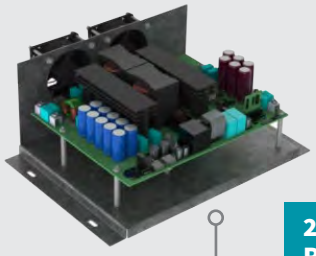
The 1000 V Silicon Carbide MOSFETs address many power design challenges by providing a unique device with low on-resistance, very low output capacitance, and low source inductance for a perfect blend of low switching losses and low conduction losses.

Wolfspeed's 1000 V Silicon Carbide MOSFETs are optimized for fast switching devices such as electric-vehicle charging systems, industrial power supplies, and renewable energy systems.

FEATURED DESIGN TOOLS



BUCK-BOOST EVALUATION BOARD
KIT-CRD-3DD12P



20kW FULL BRIDGE LLC RESONANT CONVERTER
CRD-20DD09P-2

FEATURES

- Low $R_{DS(ON)}$ over Temperature
- High-speed switching with low output capacitance
- Fast intrinsic diode with low reverse recovery (Qrr)
- Kelvin source pin

BENEFITS

- Enables a reduction in overall system cost
- Improves system efficiency while decreasing system-size
- Enables hard switching topologies
- Enables high switching frequency operation

APPLICATIONS

- Industrial Power Supplies
- Renewable energy systems
- EV-Charging Systems
- Onboard electric vehicle charging

System Specs

Part Number	Blocking Voltage (V)	$R_{DS(ON)}$ at 25°C	Current Rating at 25°C (A)	Package
C3M0065100J	1000	65 mΩ	35	TO-263-7
C3M0065100K	1000	65 mΩ	35	TO-247-4
C3M0120100J	1000	120 mΩ	22	TO-263-7
C3M0120100K	1000	120 mΩ	22	TO-247-4

1200 V SILICON CARBIDE MOSFETs

BROADEST PORTFLIO OF **1200 V SILICON CARBIDE MOSFETS FOR EFFICIENCY**

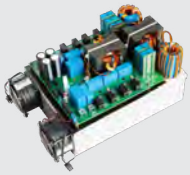
Wolfspeed's latest generation of Silicon Carbide MOSFETs set the standard for performance, ruggedness and ease of design-in. Extremely fast switching, ultra-low switching losses, stable conduction losses over temperature assure significant improvement of system efficiency, power density and overall BOM cost versus silicon MOSFET and IGBT incumbants.

Leverage Wolfspeed's extensive Silicon Carbide device portfolio, manufacturing experience, and systems expertise to accelerate your power supply design.

FEATURED DESIGN TOOLS

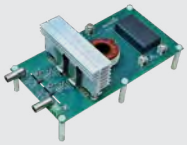
22kW HIGH EFFICIENT BI-DIRECTIONAL AFE

CRD-22AD12N



22kW Bi-directional High Efficiency DC/DC Converter

CRD-22DD12N



Buck-Boost Evaluation Kit for Wolfspeed 650 V Silicon Carbide MOSFETs

KIT-CRD-3DD065P

FEATURES

- Low $R_{DS(ON)}$ over temperature
- Fast, rugged intrinsic Silicon Carbide body diode
- High Temperature Operation (T_J=175°C)
- Very high speed switching capability
- Wide range of $R_{DS(ON)}$
- Though-hole and surface mount package options with Kelvin source pin

BENEFITS

- Lowest possible switching and conduction losses
- Minimizes system heat-sink requirement
- Enables high power density designs
- Easier to drive (+15 V gate drive)
- Lowers overall system BOM cost

APPLICATIONS

- Solar Inverters
- Battery Charging
- Energy Storage
- Switched-Mode Power Supplies
- UPS
- Motor Drive

Part Number	Blocking Voltage (V)	$R_{DS(ON)}$ at 25°C	Current Rating at 25°C (A)	Package
C3M0016120D	1200	16 mΩ	115	TO-247-3
C3M0016120K	1200	16 mΩ	115	TO-247-4
C3M0021120D	1200	21 mΩ	100	TO-247-3
C3M0021120K	1200	21 mΩ	100	TO-247-4
C3M0032120D	1200	32 mΩ	63	TO-247-3
C3M0032120J1	1200	32 mΩ	68	TO-263-7
C3M0032120K	1200	32 mΩ	63	TO-247-4
C3M0040120K	1200	40 mΩ	66	TO-247-4
C3M0040120J1	1200	40 mΩ	64	TO-263-7
C3M0075120D-A	1200	75 mΩ	30	TO-247-3
C3M0075120K-A	1200	75 mΩ	30	TO-247-4
C3M0075120J	1200	75 mΩ	30	TO-263-7
E3M0075120D	1200	75 mΩ	30	TO-247-3
E3M0075120K	1200	75 mΩ	30	TO-247-4
C3M0160120D	1200	160 mΩ	17	TO-247-3
C3M0160120J	1200	160 mΩ	17	TO-263-7
C3M0350120D	1200	350 mΩ	7.6	TO-247-3
C3M0350120J	1200	350 mΩ	7.2	TO-263-7

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 (Qrr)
- Low parasitic inductance
- ~8mm 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

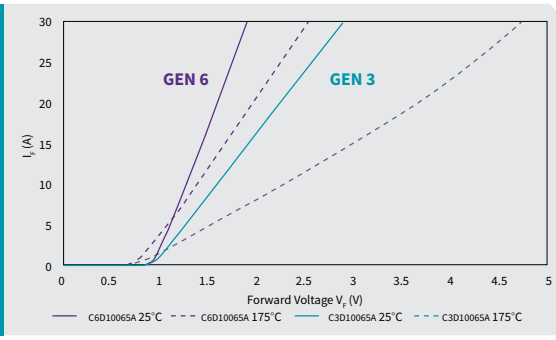
Part Number	Blocking Voltage (V)	$R_{DS(ON)}$ at 25°C	Current Rating at 25°C (A)	Package
C2M0045170D	1700	45 mΩ	72	TO-247-3
C2M0045170P	1700	45 mΩ	72	TO-247-4 Plus
C2M1000170D	1700	1000 mΩ	5	TO-247-3
C2M1000170J	1700	1000 mΩ	5.3	TO-263-7

SILICON CARBIDE SCHOTTKY DIODES

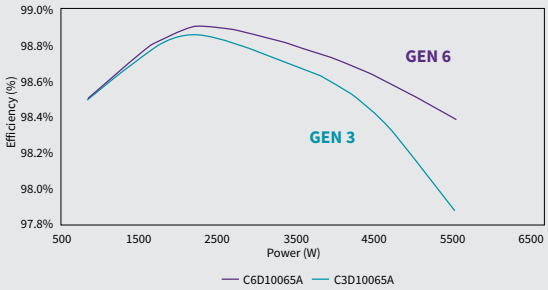
Wolfspeed's Latest Generation (C6D) Schottky Diodes

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.

Low Forward Voltage (V_F) With Improved Thermal Stability



Improved System Level Efficiency



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 x 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	Blocking Voltage (V)	Current Rating at 25°C (A)	Package
C6D04065A	650	4	TO-220-2
C6D04065E	650	4	TO-252-2
C6D06065A	650	6	TO-220-2
C6D06065E	650	6	TO-252-2
C6D06065G	650	6	TO-263-2
C6D06065Q	650	6	QFN 8x8
C6D08065A	650	8	TO-220-2
C6D08065E	650	8	TO-252-2
C6D08065G	650	8	TO-263-2
C6D08065Q	650	8	QFN 8x8
C6D10065A	650	10	TO-220-2
C6D10065E	650	10	TO-252-2
C6D10065G	650	10	TO-263-2
C6D10065Q	650	10	QFN 8x8
C6D16065D	650	16	TO-247-3
C6D20065D	650	20	TO-247-3

System Specs

SILICON CARBIDE SCHOTTKY DIODES

WOLFSPEED'S BROAD PORTFOLIO OF SILICON CARBIDE SCHOTTKY DIODES OFFERS CUSTOMER PROVEN RELIABILITY WITH MORE THAN SEVEN TRILLION FIELD HOURS OF EXPERIENCE.

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	Blocking Voltage (V)	Current Rating (A)	Package
600 V DISCRETE	CSD01060A	600	1	TO-220-2
	CSD01060E	600	1	TO-252-2
	C3D02060A	600	2	TO-220-2
	C3D02060E	600	2	TO-252-2
	C3D02060F	600	2	TO-220-F2
	C3D03060A	600	3	TO-220-2
	C3D03060E	600	3	TO-252-2
	C3D03060F	600	3	TO-220-F2
	C3D04060A	600	4	TO-220-2
	C3D04060E	600	4	TO-252-2
	C3D04060F	600	4	TO-220-F2
	C3D06060A	600	6	TO-220-2
	C3D06060F	600	6	TO-220-F2
	C3D06060G	600	6	TO-263-2
	C3D08060A	600	8	TO-220-2
	C3D08060G	600	8	TO-263-2
	C3D10060A	600	10	TO-220-2
	C3D10060G	600	10	TO-263-2
	C3D16060D	600	16	TO-247-3
	C3D20060D	600	20	TO-247-3
650 V DISCRETE	C3D02065E	650	2	TO-252-2
	C3D03065E	650	3	TO-252-2
	C3D04065A	650	4	TO-220-2
	C3D04065E	650	4	TO-252-2
	C6D04065A	650	4	TO-220-2
	C6D04065E	650	4	TO-252-2
	C3D06065A	650	6	TO-220-2
	C3D06065E	650	6	TO-252-2
	C3D06065I	650	6	TO-220 Iso
	C6D06065A	650	6	TO-220-2
	C6D06065E	650	6	TO-252-2
	C6D06065G	650	6	TO-263-2
	C6D06065Q	650	6	QFN 8x8
	C3D08065A	650	8	TO-220-2
	C3D08065E	650	8	TO-252-2
	C3D08065I	650	8	TO-220 Iso
	C6D08065A	650	8	TO-220-2
	C6D08065E	650	8	TO-252-2
	C6D08065G	650	8	TO-263-2
	C6D08065Q	650	8	QFN 8x8
	C3D10065A	650	10	TO-220-2
	C3D10065E	650	10	TO-252-2

	Part Number	Blocking Voltage (V)	Current Rating (A)	Package
650 V DISCRETE	C3D10065I	650	10	TO-220 Iso
	C6D10065A	650	10	TO-220-2
	C6D10065E	650	10	TO-252-2
	C6D10065G	650	10	TO-263-2
	C6D10065Q	650	10	QFN 8x8
	C3D12065A	650	12	TO-220-2
	C3D16065A	650	16	TO-220-2
	C3D16065D	650	16	TO-247-3
	C6D16065D	650	16	TO-247-3
	C3D20065D	650	20	TO-247-3
	C3D20065D1	650	20	TO-247-3
	C6D20065D	650	20	TO-247-3
	C3D30065D	650	30	TO-247-3
1200 V DISCRETE	C4D02120A	1200	2	TO-220-2
	C4D02120E	1200	2	TO-252-2
	C2D05120A	1200	5	TO-220-2
	C4D05120A	1200	5	TO-220-2
	C4D05120E	1200	5	TO-252-2
	C4D08120A	1200	8	TO-220-2
	C4D08120E	1200	8	TO-252-2
	C4D10120A	1200	10	TO-220-2
	C4D10120D	1200	10	TO-247-3
	C4D10120E	1200	10	TO-252-2
	C4D10120H	1200	10	TO-247-2
	C4D15120A	1200	15	TO-220-2
	C4D15120D	1200	15	TO-247-3
	C4D15120H	1200	15	TO-247-2
	C4D20120A	1200	20	TO-220-2
	C4D20120D	1200	20	TO-247-3
	C4D20120H	1200	20	TO-247-2
	C4D30120D	1200	30	TO-247-3
	C4D30120H	1200	30	TO-247-2
	C4D40120D	1200	40	TO-247-3
	C4D40120H	1200	40	TO-247-2
E-SERIES	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

E-SERIES™ AUTOMOTIVE SILICON CARBIDE PRODUCTS

INDUSTRY'S FIRST **AUTOMOTIVE-QUALIFIED SILICON CARBIDE PRODUCTS**

Wolfspeed continues to lead in Silicon Carbide with our E-Series line of Silicon Carbide MOSFETs and Schottky Diodes. The portfolio is fully automotive qualified and PPAP capable, and are specifically designed to be robust and reliable in the harshest environments. As a result, the E-Series family adds superior resistance to humidity to our already rugged technology, enabling the lowest switching losses and highest figures of merit in the most demanding applications. These devices are optimized to use in on-board automotive charger and off-board fast charging applications, and high-voltage DC/DC converters.

FEATURED DESIGN TOOLS

60kW INTERLEAVED BOOST CONVERTER
CRD-60DD12N

6.6kW HIGH POWER DENSITY BI-DIRECTIONAL EV ON-BOARD CHARGER
CRD-06600FF065N

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 (Qrr)
- Low forward voltage in diodes (V_F)

BENEFITS

- High-voltage, high-temperature, and high-humidity resistance
- Improves system efficiency with lower conduction losses
- Enables high switching frequency operation
- Enables high-reliability operation

APPLICATIONS

- Off-Board Fast Charging
- On-Board EV Charging
- Drivetrain traction inverters
- High voltage DC/DC converters

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

Part Number	Blocking Voltage (V)	$R_{DS(ON)}$ at 25°C	Current Rating at 25°C (A)	Package
E3M0120090J	900	120mΩ	22	TO-263-7
E3M0075120D	1200	75mΩ	32	TO-247-3
E3M0075120K	1200	75mΩ	32	TO-247-4

WOLFSPEED IS SERIOUS ABOUT POWER MODULES

Providing the most extensive lineup of modules to date, serving industrial, harsh environment, and mobility markets

Wolfspeed's vertical integration (from Silicon Carbide material to packaging) enables us to provide leading Silicon Carbide technology throughout the supply chain. Our power modules are designed to meet each customer's system design requirements with a package that offers best-in-class Silicon Carbide performance. We offer two distinct product categories to serve different customer value propositions: Industry-Standard Footprints and Optimized Footprints.

Industry-Standard Footprints

Wolfspeed WolfPACK™

F platform (33.8mm)

G platform (56.7mm)

B platform (62mm)

(Industrial)

(THB-80)

Optimized Footprint

X platform (53mm)

H platform
(High performance 62mm)

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

CGD12HBXMP

	SKU	Package	Designed By	Working Voltage	Gate Driver	Output Channels
COMPANION GATE DRIVERS	CGD1200HB2P-BM2	B Platform	Wolfspeed	1000 V	Analog Devices AduM4135	2
	CGD1200HB2P-BM3	B Platform	Wolfspeed	1000 V	Analog Devices AduM4135	2
	CGD1700HB2M-UNA	F Platform, G Platform	Wolfspeed	1200 V	Texas Instruments UCC21710	2
	EVAL-ADUM4146WHB1Z	F Platform, G Platform	Partner	1200 V	Analog Devices AduM4146	2
	Si823H-AxWA-KIT	F Platform, G Platform	Partner	1200 V	Silicon Labs Si823Hx	2
	CGD15HB62LP	H Platform	Wolfspeed	1500 V	IXDD614YY	2
	CGD1700HB3P-HM3	H Platform	Wolfspeed	1500 V	IXDD614YY	2
	CGD12HBXMP	X Platform	Wolfspeed	1000 V	Analog Devices AduM4135	2

WOLFSPEED MODULES

	Part Number	Blocking Voltage (V)	Nominal Current (A)	$R_{DS(ON)}$ (mΩ) at 25°C	Description
G PLATFORM std. 56.7mm	CAB006A12GM3	1200	200	6	Half-Bridge, AlN Substrate
	CAB006M12GM3	1200	200	6	Half-Bridge, Al_2O_3 Substrate
	CAB008A12GM3	1200	194	8	Half-Bridge, AlN Substrate
	CAB008M12GM3	1200	146	8	Half-Bridge, Al_2O_3 Substrate
F PLATFORM std. 33.8mm	CAB011M12FM3	1200	105	11	Half-Bridge, Al_2O_3 Substrate
	CAB016M12FM3	1200	78	16	Half-Bridge, Al_2O_3 Substrate
	CCB021M12FM3	1200	51	21	Six-Pack, Al_2O_3 Substrate
	CCB032M12FM3	1200	40	32	Six-Pack, Al_2O_3 Substrate
B PLATFORM standard 62mm	CAB530M12BM3	1200	530	2.7	Half-Bridge, C3M MOSFETs
	CAS530M12BM3*	1200	530	2.7	Half-Bridge, C2M MOSFETs + Schottky Diodes
	WAS530M12BM3*	1200	530	2.7	Half-Bridge, THB-80 Qualified, C3M MOSFETs + Schottky Diodes
	WAB400M12BM3	1200	400	3.7	Half-Bridge, THB-80 Qualified, C3M Conduction-Optimized MOSFETs
	CAS350M12BM3*	1200	350	4	Half-Bridge, C3M MOSFETs + Schottky Diodes
	WAS350M12BM3*	1200	350	4	Half-Bridge, THB-80 Qualified, C3M MOSFETs + Schottky Diodes
	WAB300M12BM3	1200	300	4.5	Half-Bridge, THB-80 Qualified, C3M Switching-Optimized MOSFETs
	CAS300M12BM2	1200	300	5	Half-Bridge, C2M MOSFETs + Schottky Diodes
	CAS175M12BM3*	1200	175	8	Half-Bridge, C3M MOSFETs + Schottky Diodes
	WAS175M12BM3*	1200	175	8	Half-Bridge, THB-80 Qualified, C3M MOSFETs + Schottky Diodes
	CAS110M12BM2	1200	110	12.5	Half-Bridge, C2M MOSFETs + Schottky Diodes
	CAS120M12BM2	1200	120	13	Half-Bridge, C2M MOSFETs + Schottky Diodes
	CAS310M17BM3*	1700	310	5	Half-Bridge, C3M MOSFETs + Schottky Diodes
	WAS310M17BM3*	1700	310	5	Half-Bridge, THB-80 Qualified, C3M MOSFETs + Schottky Diodes
	CAS300M17BM2	1700	300	8	Half-Bridge, C2M MOSFETs + Schottky Diodes
X PLATFORM optimized 53mm	CAB450M12XM3	1200	450	2.6	Half-Bridge, C3M Conduction-Optimized MOSFETs
	EAB450M12XM3*	1200	450	2.6	Automotive grade, Half-Bridge, C3M Conduction-Optimized MOSFETs
	CAB425M12XM3	1200	425	3.2	Half-Bridge, C3M Switching-Optimized MOSFETs
	CAB400M12XM3	1200	400	4	Half-Bridge, C3M Switching-Optimized MOSFETs
	CAB320M17XM3*	1700	320	4	Half-Bridge, C3M MOSFETs
H PLATFORM optimized 62mm	CAR600M12HN6*	1200	600	N/A	Half-Bridge Rectifier, Gen 6 Schottky Diodes
	CAB760M12HM3	1200	765	1.33	Half-Bridge, C3M Switching-Optimized MOSFETs
	CAS480M12HM3	1200	480	2.29	Half-Bridge, C3M Switching-Optimized MOSFETs + Schottky Diodes
	CAB650M17HM3*	1700	650	1.67	Half-Bridge, 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

*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.

GM3

FM3

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
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

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
- Wind Energy
- Renewable Energy Storage

	Part Number	Blocking Voltage (V)	Nominal Current (A)	$R_{DS(ON)}$ (mΩ) at 25°C	Description
G PLATFORM standard 56.7mm	CAB006A12GM3	1200	200	6	Half-Bridge, AlN Substrate
	CAB006M12GM3	1200	200	6	Half-Bridge, Al_2O_3 Substrate
	CAB008A12GM3	1200	194	8	Half-Bridge, AlN Substrate
	CAB008M12GM3	1200	146	8	Half-Bridge, Al_2O_3 Substrate
F PLATFORM standard 33.8mm	CAB011M12FM3	1200	105	11	Half-Bridge, Al_2O_3 Substrate
	CAB016M12FM3	1200	78	16	Half-Bridge, Al_2O_3 Substrate
	CCB021M12FM3	1200	51	21	Six-Pack, Al_2O_3 Substrate
	CCB032M12FM3	1200	40	32	Six-Pack, Al_2O_3 Substrate

B MODULE PLATFORM

WOLFSPEED'S 62MM 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 62mm 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 all BM2 modules
CGD1200HB2P-BM3 for all BM3 modules

SUPPORTING EVALUATION KIT:
KIT-CRD-CIL12N-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
- Fast Charging
- On-Board Charging
- Industrial Automation & Testing
- Renewable Energy

B PLATFORM standard 62mm

Part Number	Blocking Voltage (V)	Nominal Current (A)	$R_{DS(ON)}$ (mΩ) at 25°C	Description
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
WAB400M12BM3	1200	400	3.7	Half-Bridge, THB-80 Qualified, C3M Conduction-Optimized MOSFETs
CAS350M12BM3*	1200	350	4	Half-Bridge, C3M MOSFETs + Schottky Diodes
WAS350M12BM3*	1200	350	4	Half-Bridge, THB-80 Qualified, C3M MOSFETs + Schottky Diodes
WAB300M12BM3	1200	300	4.5	Half-Bridge, THB-80 Qualified, C3M Switching-Optimized MOSFETs
CAS300M12BM2	1200	300	5	Half-Bridge, C2M MOSFETs + Schottky Diodes
CAS175M12BM3*	1200	175	8	Half-Bridge, C3M MOSFETs + Schottky Diodes
WAS175M12BM3*	1200	175	8	Half-Bridge, THB-80 Qualified, C3M MOSFETs + Schottky Diodes
CAS110M12BM2	1200	110	12.5	Half-Bridge, C2M MOSFETs + Schottky Diodes
CAS120M12BM2	1200	120	13	Half-Bridge, C2M MOSFETs + Schottky Diodes
CAS310M17BM3*	1700	310	5	Half-Bridge, C3M MOSFETs + Schottky Diodes
WAS310M17BM3*	1700	310	5	Half-Bridge, THB-80 Qualified, C3M MOSFETs + Schottky Diodes
CAS300M17BM2	1700	300	8	Half-Bridge, C2M MOSFETs + Schottky Diodes

*Coming Soon

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 (Si3N4) power substrate to ensure mechanical robustness under extreme conditions.

SUPPORTING GATE DRIVER:
CGD12HBXMP

SUPPORTING EVALUATION KIT:
KIT-CRD-CIL12N-XM3

SUPPORTING REFERENCE DESIGNS:
CRD***DA12E-XM3
***=200, 250, 300, 600

MODULE SIZE:
80 x 53 x 19 (mm)

TOPOLOGY:
Half-Bridge

FEATURES

- 50% smaller/lighter than standard 62mm 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 62mm Compatible Baseplate Enables System Retrofit
- Increased System Efficiency, due to Low Switching & Conduction Losses of Silicon Carbide
- High Reliability, Robust Material Selection

APPLICATIONS

- Servo & Industrial Drives
- UPS
- EV Fast Charging
- EV On-Board Charging
- Industrial Automation & Testing
- Power Supplies

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

*Coming Soon

H MODULE PLATFORM

THE BEST-IN-CLASS 62MM 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 62mm module. The HM platform's Silicon Carbide optimized packaging enables 175°C continuous junction operation with a high-reliability Silicon Nitride (Si_3N_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-HM
coming soon

MODULE SIZE:
110 mm x 65 mm x 12.2 mm

TOPOLOGY:
Half-Bridge

FEATURES

- Low Inductance, Low Profile 62mm Footprint
- High Junction Temperature (175 °C) Operation
- Light Weight AlSiC Baseplate
- High Reliability Silicon Nitride Insulator

BENEFITS

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

APPLICATIONS

- Railway Technology
- Solar
- 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 62mm	CAR600M12HN6*	1200	600	N/A	Half-Bridge Rectifier, Gen 6 Schottky Diodes
	CAB760M12HM3	1200	765	1.33	Half-Bridge, C3M Switching-Optimized MOSFETs
	CAS480M12HM3	1200	480	2.29	Half-Bridge, C3M Switching-Optimized MOSFETs + Schottky Diodes
	CAB650M17HM3*	1700	650	1.67	Half-Bridge, 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

*Coming Soon

DESIGN TOOLS

START MODELING FOR YOUR DESIGN WITH SpeedFIT™

WELCOME TO SpeedFit 2.0

Welcome to SpeedFit 2.0, 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 2.0 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 with resonant DC/DC converter.

USING SpeedFIT 2.0, 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)*
- No. of AC phases *(1, 3)*

Input Design Specifications →

- Input voltage
- Output voltage
- Rated output power S_o
- AC frequency F_{ac}
- Switching frequency F_{sw}
- Deadtime
- Select Circuit Type
  Buck-boost converter
  LLC resonant converter
  Phase shift full bridge converter etc.

Input Design Specifications →

- Select the device from recommended products list
- Number of devices to be paralleled

Input Thermal Management Specs →

- Cooling System
- *Thermal interface resistance $R_{th,ch}$*
- *Heatsink temperature T_h*
- *Thermal resistance $R_{th,ha}$*
- *Heatsink time constant $ł_{ha}$*
- *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 2.0 AT **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
Buck-Boost Evaluation Kit for Wolfspeed 650 V Silicon Carbide MOSFETs	DC to DC, Dynamic Characterization	TO-247-3, TO-247-4	KIT-CRD-3DD065P
Buck Boost Evaluation Board	DC to DC, Dynamic Characterization	TO-247-3, TO-247-4	KIT-CRD-3DD12P
Evaluation Board For Paralleling 1200 V C3M Silicon Carbide MOSFETs in a 7-pin, (TO-263 Package)	DC to DC, Dynamic Characterization	TO-263-7	KIT-CRD-HB12N-J1
Evaluation Board for 650 V Silicon Carbide C3M MOSFET in a 7-pin D2PAK (TO-263-7L)	Dynamic Characterization	TO-263-7	KIT-CRD-8FF65P
Evaluation Board for 900 V Silicon Carbide C3M MOSFET in a 7-pin D2PAK (TO-263-7L)	Dynamic Characterization	TO-263-7	KIT-CRD-8FF90P
Dynamic Characterization Evaluation Tool Optimized for the 62mm (BM) Module Platform	Dynamic Characterization	B platform	KIT-CRD-CIL12N-BM
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 62mm (HM) Module Platform	Dynamic Characterization	H platform	KIT-CRD-CIL12N-HM / KIT-CRD-CIL17N-HM (coming soon)
Evaluation Tool for the XM3 Module Platform	AC to DC, Dynamic Characterization	X platform	KIT-CRD-CIL12N-XM3

*All of these Evaluation kits are designed by Wolfspeed

TO LEARN MORE, VISIT US AT **WOLFSPEED.COM/POWER**

SYSTEM SOLUTIONS

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.

600 kW High Performance Dual Three-Phase Inverter

Topology:
AC to DC, DC to AC

Package:
X Platform

CRD600DA12E-XM3

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.

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_{rms} output current
- Parallel Bridge Operation -720 A_{rms} output current

25kW Silicon Carbide Active Front End (AFE)

Topology:
AC to DC

Package:
F Platform

CRD25AD12N-FMC

This reference design demonstrates the application of Wolfspeed's WolfPACK™ power modules to create a bidirectional high power density Active Front End (AFE) that can be applied to electric vehicle (EV) fast charging, industrial motor drives, power supplies and renewable energy applications.

Specifications:

- Three Phase input voltage between 400 and 480 VAC
- Output Voltage of 800 V DC/ 900 V Max
- Output Power: 25 kW with 480 VAC input and 20 kW with 400 VAC input
- Switching frequency of 100Khz
- Controller board design and firmware example
- Auxiliary Circuitry Included for Safe Operation: Pre Charge Soft Start, Contactors, Fuses and EMI/ EMC Filter
- Complete Stack up Including: Modules, Heatsink, Magnetics, Power PCBs, Gate Drivers, Voltage / Current Sensors, and Controller

22kW 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™ Silicon Carbide MOSFETs to create a 22kW 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: 45kHz
- Tooled heatsink to simulate cooling plate
- CAN interface

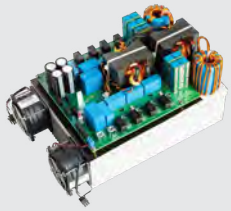
PFC Mode

- Max current: 32A
- Three Phase Input Voltage: 305 Vrms → 450 Vrms line-line 50/60Hz
- Output DC Voltage: 650 V → 900 V, Max power 22kW
- Single Phase Input Voltage: 180 Vrms → 264 Vrms 50/60Hz
- Output DC Voltage: 380 V → 900 V, Max power 6.6kW

Inverter Mode

- DC Input Voltage: 350 V → 760 V DC
- Max current: 20A
- AC Output Voltage: 230 Vrms 50Hz single phase
- Max power: 6.6kW

22kW Bi-directional High Efficiency DC/DC Converter



Topology:
DC to DC

Package:
TO-247-4

CRD-22DD12N

The design accomplishes peak efficiencies of 98.5% in both charging and discharging mode power densities of 8kW/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 135-250kHz
- Tooled heatsink to simulate cooling plate
- CAN interface

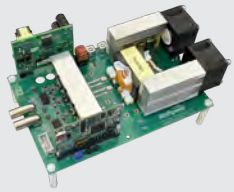
Charging Mode

- Input Voltage: 380 V-900 V DC
- Output Voltage: 480 V-800 V DC Nominal. System capable of 200 V-800 V DC
- At Vin=650 V-900 V DC , Output Power : 22kW, Output current: 36A
- At Vin=380 V-900 V DC , Output Power : 6.6kW, Output current: 26.4A

Discharging Mode

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

6.6 kW High Frequency DC-DC Converter



Topology:
DC to DC

Package:
TO-247-3

CRD-06600DD065N

Specifications:

- Input Voltage: 380 VDC → 420 VDC
- Output Voltage 400 VDC
- Max current: 16.5A
- Output Power: 6.6kW
- Switching Frequency: 500kHz – 1 MHz
- Closed loop control for regulated output
- Optional external PWM inputs for open loop testing

2.2 kW High Efficiency (80Plus 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 mΩ Silicon Carbide MOSFETs. Comfortably achieve Titanium standard by having > 98.5% efficiency while THD < 4% under all load conditions.

Specifications:

- Parameters Values Note
- Input voltage range, 47-63Hz 180-264 V (rms)
- Output voltage 385 V nominal +/- 5%
- Output power
- 2,200 W At 230 V AC
- 1,500 W (limited by thermal) At 180 V AC
- Input power factor >.98
- Input THD at full load <5% (of fundamental)
- Switching frequency 64KHz
- Efficiency at 50% load >98.5%
- Max ambient operating temperature 50 °C
- Cooling Forced air, 15x40mm Fan
- Topology Totem pole Diode as LF switch
- Power devices package TO-247-3, TO-247-4, TO-263-7

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

Topology:
AC to DC, DC to AC

Package:
TO-247-3

CRD-06600FF065N

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: Peak efficiencies of 96.5% and power densities of 53W/in^3 or 3KW/L.

Specifications:

- Universal single phase input voltage between 90 V and 265 V
- Output Voltage of 250 V-450 V DC
- 18A Output Current in charging mode
- Front End AC/DC PFC using CCM Totem-Pole Bi-Directional Topology operating at 67Khz
- Bi-Directional DC/DC CLLC resonant converter operating at 148-300KHz
- Constant Current, Constant Voltage or Constant Power Mode
- Unique integrated heatsink design removes heat from MOSFETs, transformer and inductors
- CAN Interface

300kW, 250kW & 200kW 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 ARMS output
- 80kHz maximum switching frequency
- 300uF DC Link Capacitance
- Liquid cooled cold plate
- CAN Interface

20 kW Full Bridge LLC Resonant Converter Using 1k V Silicon Carbide MOSFET

Topology:
DC to DC
Package:
TO-247-4

CRD-20DD09P-2

Specifications:

- Input Voltage: 650 – 750 VDC
- Output Voltage: 300 – 550 VDC
- Switching Frequency: 150-400 kHz
- Continuous Output Power: 20kW
- Pk. Efficiency: >98.4%
- Power Density: 60W Cu/in

Wide Input Voltage Range (300 VDC – 1200 VDC) 15W 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, 1Ω Silicon Carbide MOSFET with an availability of high blocking voltage and high creepage distance (~7mm)
- 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, 1Ω Silicon Carbide MOSFET helps in reducing form factor of the board significantly

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 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

60 kW Interleaved Boost Converter

Topology:
DC to DC
Package:
TO-247-4

CRD-60DD12N

Specifications:

- Demonstration of new 1200 V, 75 mΩ C3M Silicon Carbide MOSFET and its parallel operation in a 60 kW Interleaved Boost Converter
- 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/in3

Wolfspeed®

NOBODY KNOWS SILICON CARBIDE POWER DEVICES LIKE WOLFSPEED.
WE'RE GLAD TO SHARE WHAT WE KNOW, AND WE LOVE TALKING ABOUT THIS STUFF.
VISIT WOLFSPEED.COM TO CONNECT WITH THE SILICON CARBIDE EXPERTS.

MARCH 2022 - NC - V2