TO-247-3

SiC Power MOSFETs

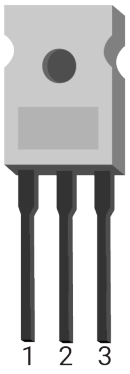
Cactus Materials Power MOSFETs exceed power, efficiency and portability capabilities of standard silicon devices and are available in a variety of breakdown voltages (650V, 1200V, 1700V & 3300V) and current ratings. They have low on-resistance and low leakage in the blocking state. Fabricated on high-quality SiC epitaxial layers, our proprietary fabrication process includes carefully chosen annealing procedures to ensure a high-quality SiC-SiO_2 gate oxide dielectric layer. Doping profile neck region and edge termination ensure extremely low R_{ON} and high breakdown voltage.

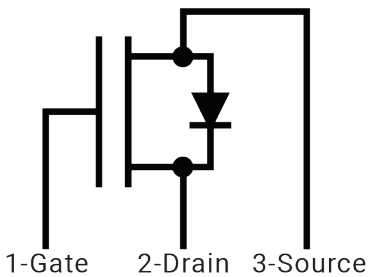
BENEFITS

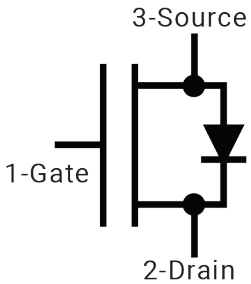
- ☑ Higher efficiency
- ☑ Reduced cooling
- ☑ Increased power
- ☑ Reduced system volume

APPLICATIONS INCLUDE

Electromechanical power converters, DC to DC, AC to DC and DC to AC converters, switching power supplies, electric vehicles, hybrid vehicles, solar and wind energy power converters.







Part Number	Package	Marking
CM-080-SCMB-120C	TO-247-3	Cactus Materials

sales@cactusmaterials.com
2507 W Geneva Drive, Tempe, AZ 85282
cactusmaterials.com

Maximum Ratings

*Characteristics	Symbol	Comments	Min	Typ	Max	Units
DC blocking voltage	V_{DSmax}	T_J=25°C to 175°C		1200		V
Gate input voltage range	V_{GS}	Recommended range Dynamic	-5 -5		15 18	V
Avalanche rating	V_{AVA}	V_{GS}=0V; ID=0.1mA; T_J=25°C V_{GS}=0V; ID=0.1mA; T_J=175°C	1200 1200	1388 1425		V
Pulsed drain current	ID_{pulsed}	V_{GS}=15V; T_J=25°C V_{GS}=15V; T_J=175°C		20 14		A
Continuous drain current	ID	V_{GS}=15V; T_J=25°C V_{GS}=15V; T_J=175°C		18 12		A
Continuous drain power	P	V_{GS}=15V; T_J=25°C		100		W
Maximum- junction temperature	T_{jmax}	Normal operation During processing / soldering			175 250	°C

Electrical and Thermal Characteristics

*Characteristics	Symbol	Comments	Min	Typ	Max	Units
Gate threshold voltage	V_{TH}	V_{GS}=V_{DS}; I_{DS}=5mA; T_J=25°C V_{GS}=V_{DS}; I_{DS}=5mA; T_J=175°C		2.4 1.3		V
Gate leakage	I_{GSS}	V_{GS}=15V; V_{DS}=0; T_J=25°C V_{GS}=15V; V_{DS}=0; T_J=175°C		45 80		pA
Drain leakage	I_{DSS}	V_{DS}=1000V; V_{GS}=0; T_J=25°C V_{DS}=1000V; V_{GS}=0; T_J=175°C		4.5 5.5		nA µA
Drain-source on-resistance	R_{DSON}	V_{GS}=15V; I_{DS}=5A; T_J=25°C V_{GS}=15V; I_{DS}=5A; T_J=175°C		83 133		mΩ
Transconductance	G_m	V_{DS}=10V; I_{DS}=20A; T_J=25°C V_{DS}=10V; I_{DS}=20A; T_J=175°C		9 8.6		S
Input capacitance	C_{ISS}	V_{GS}=0V; V_{DS}=200V; f=1MHz; T_J=25°C		810		pF
Output capacitance	C_{ISS}			108		
Reverse transfer capacitance	C_{ISS}			19		
Stored energy at output	E_{OSS}	V_{GS}=-5/15V; V_{DS}=200V; f=1MHz; T_J=25°C		4.3		µJ
Turn on switching energy	E_{ON}			16.6		
Turn off switching energy	E_{OFF}			4.8		
Rise time	t_r	V_{GS}=-5/15V; V_{DS}=1kV; ID=10A; RG=0Ω; T_J=25°C		15		nS
Fall time	t_f			10		
Turn off delay time	t_d	V_{GS}=-5/15V; V_{DS}=200V; ID=10A; RG=0Ω; T_J=25°C		17		nS
Gate Charge	Q_G			16		
Internal gate resistance	R_G	f=1Mz; V_{AC}=25mV; T_J=25°C		5		Ω
Thermal resistance: Junction to Case	R_{JC}			1.5		°C/W

Body diode characteristics						
*Characteristics	Symbol	Comments	Min	Typ	Max	Units
Diode forward voltage	V_F	I_F=3A; V_{GS}=0V; T_J=25°C I_F=3A; V_{GS}=0V; T_J=175°C		2.6 2.1		V
Pulsed diode current	$I_{s(pulsed)}$	V_{GS}=0V; V_{DS}=-3V; T_J=25°C V_{GS}=0V; V_{DS}=-3V; T_J=175°C		5.8 8.9		A
Reverse recovery time	t_{rr}	V_{DS}=0-200V; V_{GS}=0V; T_J=25°C		7		ns
Reverse recovery charge	Q_{rr}	V_{DS}=0-200V; V_{GS}=0V; T_J=25°C		28.9		nC

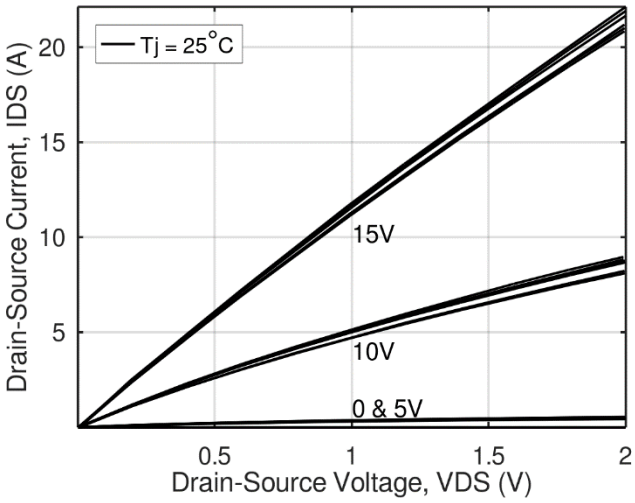


Figure 1: Room temperature output characteristics. VGS = 0, 5, 10, 15V; TJ = 25°C.

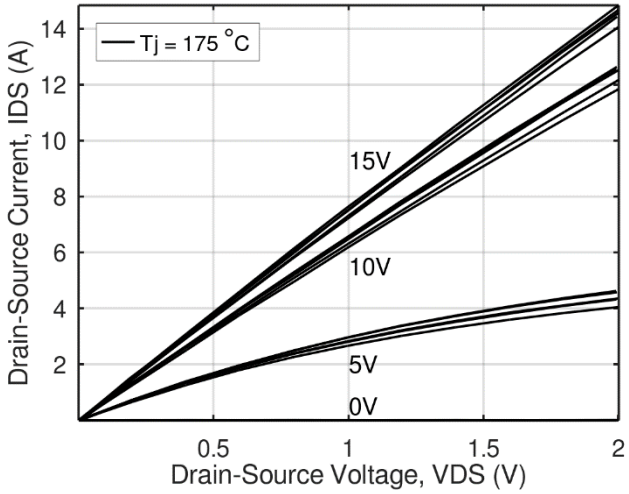


Figure 2: High temperature output characteristics. VGS = 0, 5, 10, 15V; TJ = 175°C.

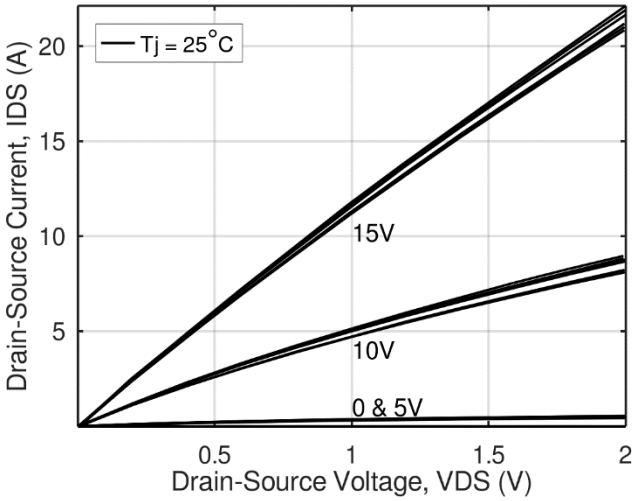


Figure 3: On-Resistance vs. Drain Current. TJ = 25°C, 175°C.

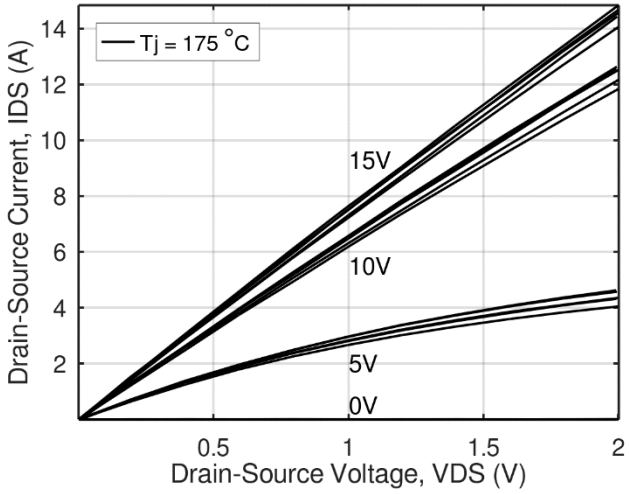


Figure 4: Drain Current vs. Threshold Voltage. TJ = 25°C, 175°C.

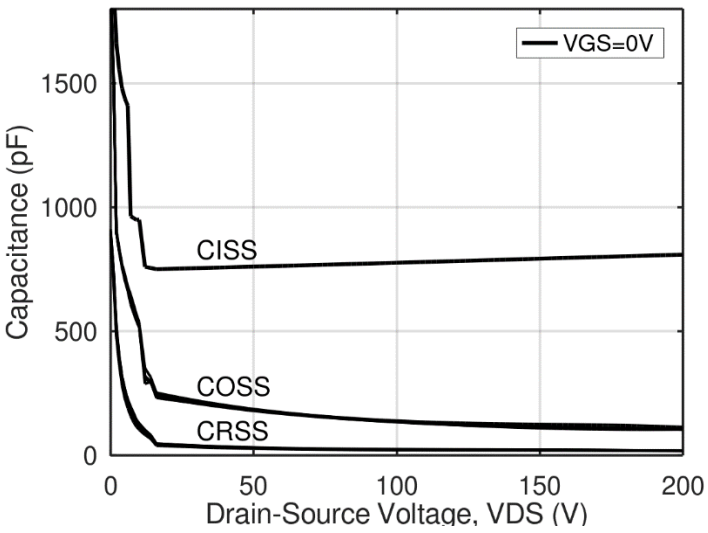


Figure 5: Capacitances vs. Drain-Source Voltage. TJ = 25.

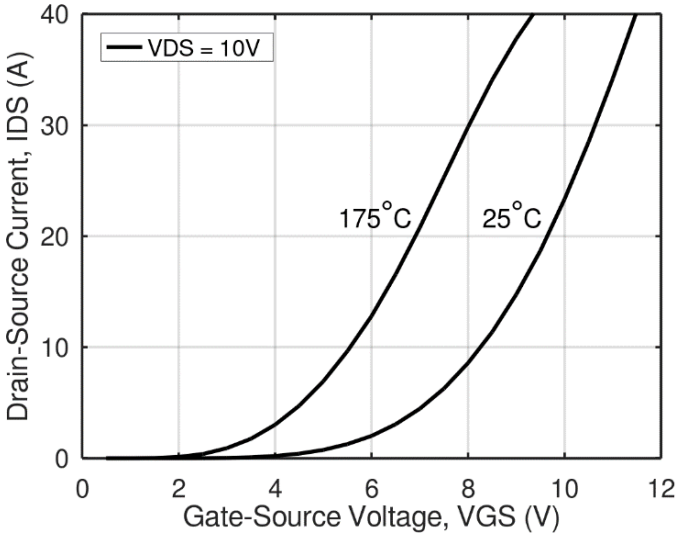


Figure 6: Transfer characteristics. TJ = 25, 175°C.

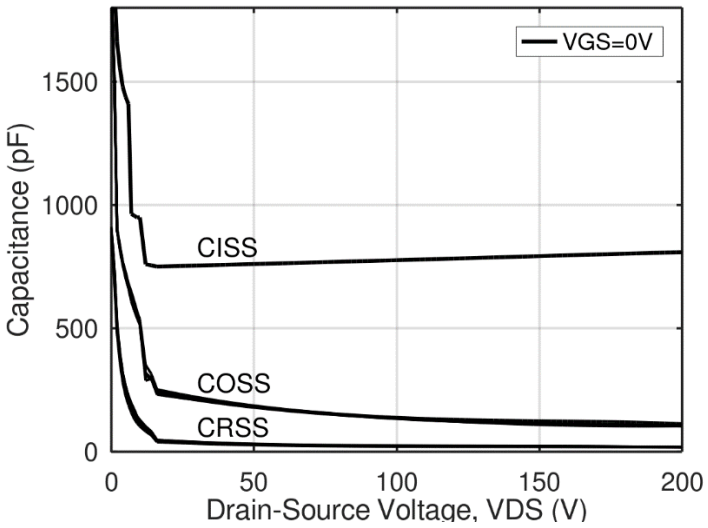


Figure 7: Transconductance vs. Drain Current. TJ = 25, 175°C.

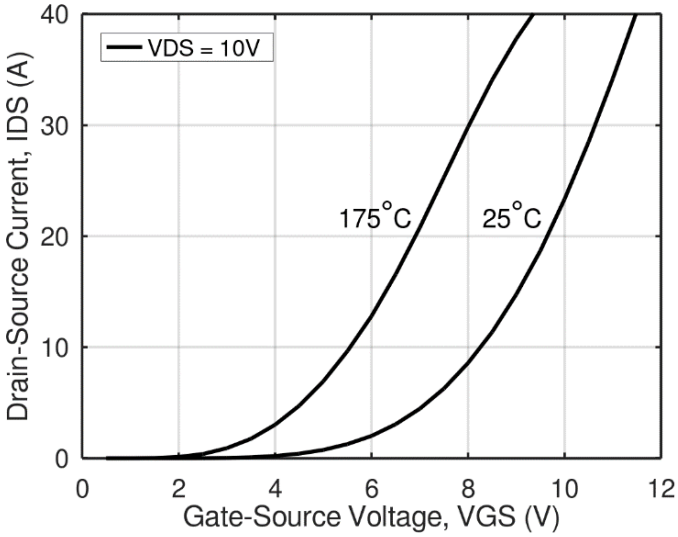


Figure 8: Biode Diode Characteristics. TJ = 25, 175°C.

CAUTION: These devices are ESD sensitive. User proper handling procedures.