



## T0-247-3

### SiC Power MOSFETs

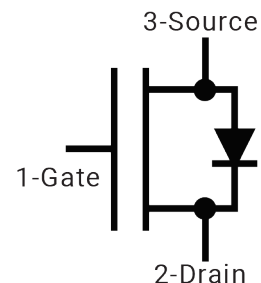
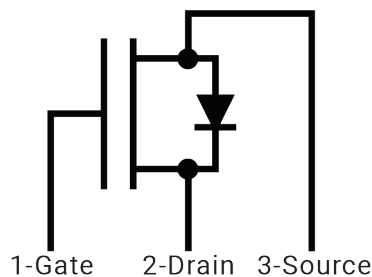
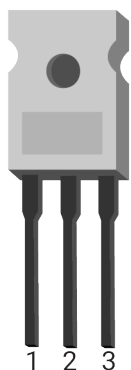
Cactus Materials Power MOSFETs exceed power, efficiency and portability capabilities of standard silicon devices and are available in a variety of breakdown voltages (650V, 1200V, 1700V & 3300V) and current ratings. They have low on-resistance and low leakage in the blocking state. Fabricated on high-quality SiC epitaxial layers, our proprietary fabrication process includes carefully chosen annealing procedures to ensure a high-quality SiC-SiO<sub>2</sub> gate oxide dielectric layer. Doping profile neck region and edge termination ensure extremely low R<sub>ON</sub> 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-098-SCMB-065C	T0-247-3	Cactus Materials

Maximum Ratings						
*Characteristics	Symbol	Comments	Min	Typ	Max	Units
DC blocking voltage	$V_{DSmax}$	$T_J=25^{\circ}C$		650		V
Gate input voltage range	$V_{GS}$	Recommended range Dynamic	-5 -5		15 18	V
Avalanche rating	$V_{AVA}$	$T_J=25^{\circ}C$		750		V
Pulsed drain current	$ID_{pulsed}$	$V_{GS}=15V; V_{DS}=2V; T_J=25^{\circ}C$ $V_{GS}=15V; V_{DS}=2V; T_J=175^{\circ}C$		18 15		A
Continuous drain current	ID	$V_{GS}=15V; T_J=25^{\circ}C$ $V_{GS}=15V; T_J=175^{\circ}C$		12 10		A
Continuous drain power	P	$V_{GS}=15V; T_J=25^{\circ}C$		100		W
Maximum- junction temperature	$T_{jmax}$	Normal operation During processing / soldering			175 250	$^{\circ}C$

Electrical and Thermal Characteristics						
*Characteristics	Symbol	Comments	Min	Typ	Max	Units
Gate threshold voltage	$V_{TH}$	$V_{GS}=V_{DS}; I_{DS}=5mA; T_J=25^{\circ}C$ $V_{GS}=V_{DS}; I_{DS}=5mA; T_J=175^{\circ}C$		2.5 1.4		V
Gate leakage	$I_{GSS}$	$V_{GS}=15V; V_{DS}=0; T_J=25^{\circ}C$ $V_{GS}=15V; V_{DS}=0; T_J=175^{\circ}C$		2.1 159		pA
Drain leakage	$I_{DSS}$	$V_{DS}=600V; V_{GS}=0; T_J=25^{\circ}C$ $V_{DS}=600V; V_{GS}=0; T_J=175^{\circ}C$		1.3 310		nA
Drain-source on-resistance	$R_{DS(on)}$	$V_{GS}=15V; I_{DS}=5A; T_J=25^{\circ}C$ $V_{GS}=15V; I_{DS}=5A; T_J=175^{\circ}C$		98 131		m $\Omega$
Transconductance	$G_m$	$V_{DS}=10V; I_{DS}=10A; T_J=25^{\circ}C$ $V_{DS}=10V; I_{DS}=10A; T_J=175^{\circ}C$		5.3 5.7		S
Input capacitance	$C_{ISS}$			980		
Output capacitance	$C_{OSS}$	$V_{GS}=0V; V_{DS}=200V;$ $f=1MHz; T_J=25^{\circ}C$		138		pF
Reverse transfer capacitance	$C_{RSS}$			14.7		
Stored energy at output	$E_{OSS}$	$V_{GS}=200V; f=1MHz; T_J=25^{\circ}C$		5.5		$\mu J$
Turn on switching energy	$E_{ON}$	$V_{GS}=-5/15V; V_{DS}=200V;$ $f=1MHz; T_J=25^{\circ}C$		19.7		$\mu J$
Turn off switching energy	$E_{OFF}$	$V_{GS}=-5/15V; V_{DS}=200V;$ $f=1MHz; T_J=25^{\circ}C$		6.0		$\mu J$
Rise time	$t_R$	$V_{GS}=-5/15V; V_{DS}=1kV; ID=10A;$ $RG=0\Omega; T_J=25^{\circ}C$		20		nS
Fall time	$t_F$	$V_{GS}=-5/15V; V_{DS}=1kV; ID=10A;$ $RG=0\Omega; T_J=25^{\circ}C$		15		nS
Turn off delay time	$t_D$	$V_{GS}=-5/15V; V_{DS}=200V; ID=10A;$ $RG=0\Omega; T_J=25^{\circ}C$		10		nS
Gate Charge	$Q_G$	$V_{GS}=-5/15V; V_{DS}=200V; ID=10A;$ $RG=0\Omega; T_J=25^{\circ}C$		10		nS
Internal gate resistance	$R_G$	$f=1MHz; V_{AC}=25mV; T_J=25^{\circ}C$		5		$\Omega$
Thermal resistance: Junction to Case	$R_{JC}$			1.5		$^{\circ}C/W$

Body diode characteristics						
*Characteristics	Symbol	Comments	Min	Typ	Max	Units
Diode forward voltage	$V_F$	$I_F=3A; V_{GS}=0V; T_J=25^\circ C$ $I_F=3A; V_{GS}=0V; T_J=175^\circ C$		2.7 2.2		V
Pulsed diode current	$I_{s(pulsed)}$	$V_{GS}=0V; V_{DS}=-3V; T_J=25^\circ C$ $V_{GS}=0V; V_{DS}=-3V; T_J=175^\circ C$		5.1 8.2		A
Reverse recovery time	$t_{rr}$			2		ns
Reverse recovery charge	$Q_{rr}$	$V_{DS}=0-200V; V_{GS}=0V; T_J=25^\circ C$		40		nC

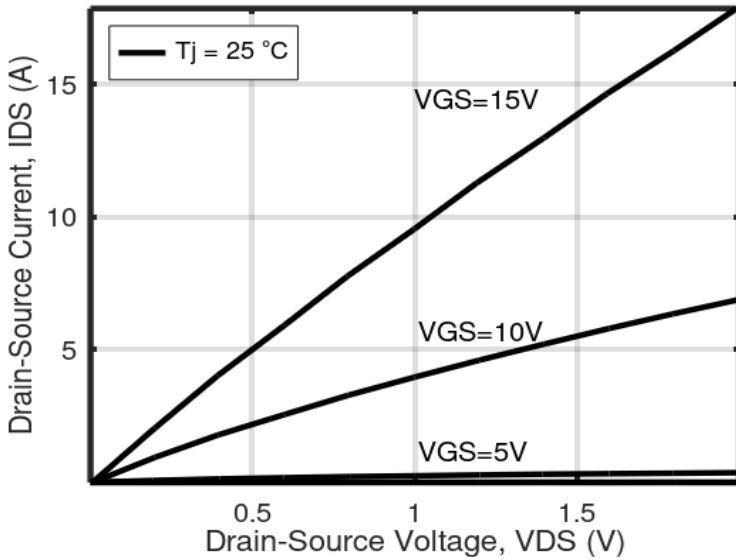


Figure 1: Output Characteristics  $T_J = 25^\circ C$ .

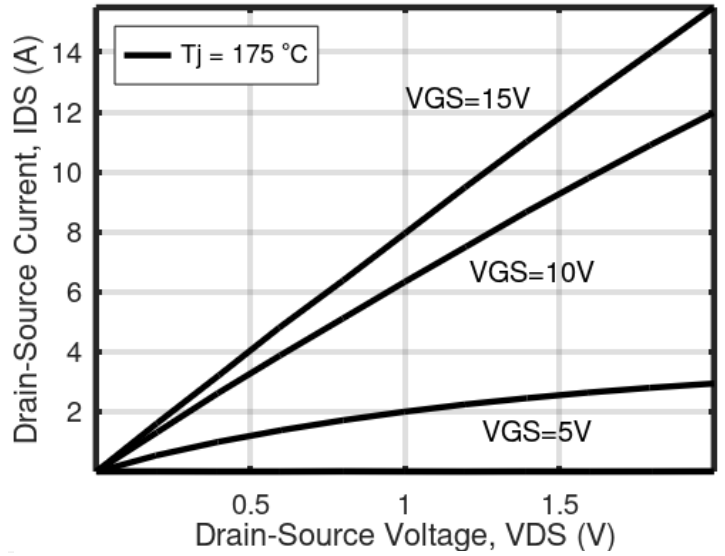


Figure 2: Output Characteristics  $T_J = 175^\circ C$ .

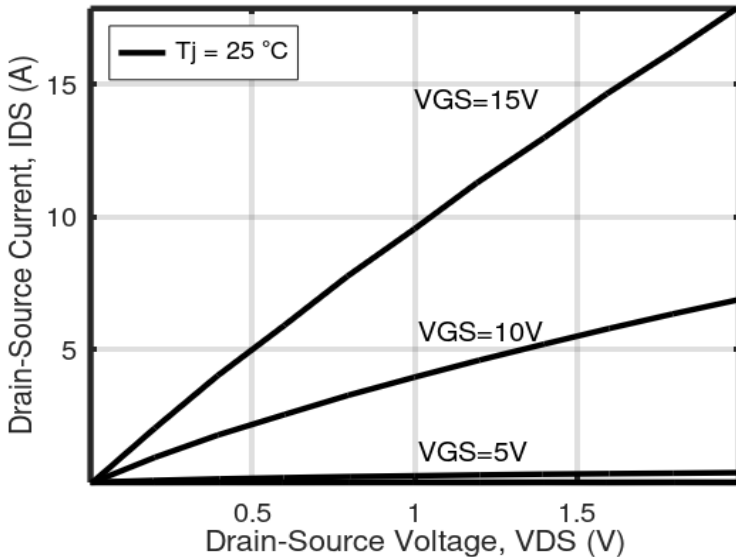


Figure 3: On-Resistance vs. Drain Current. For Various Temperatures

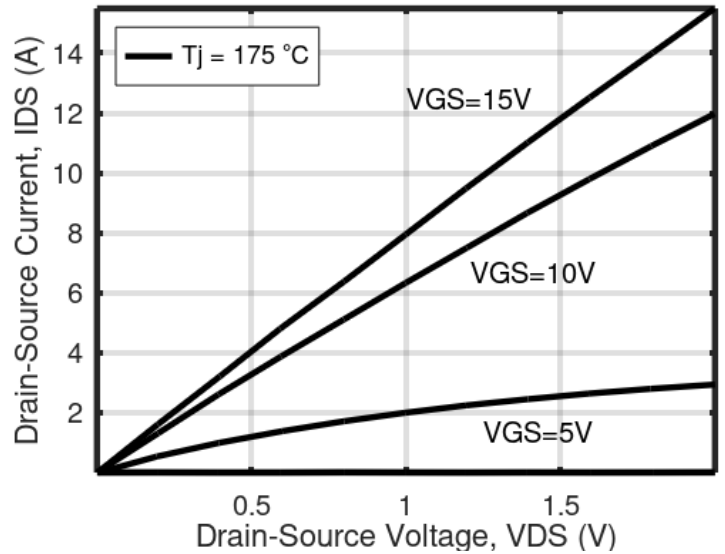
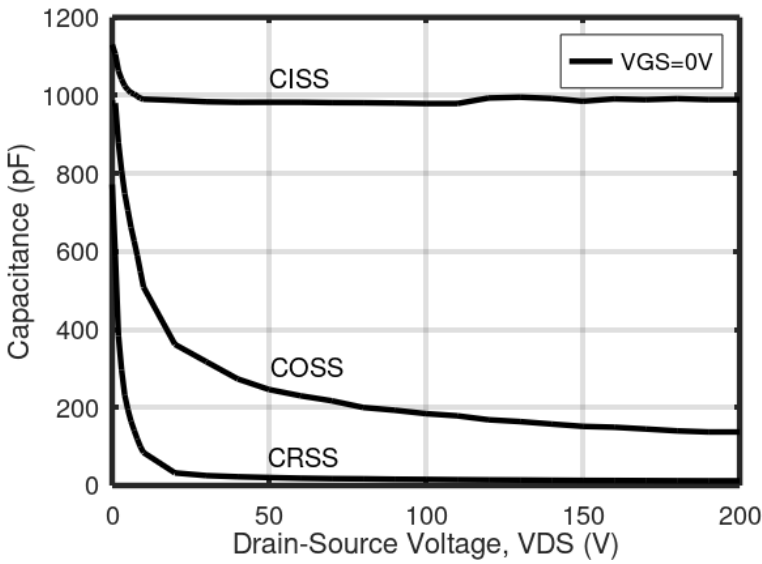
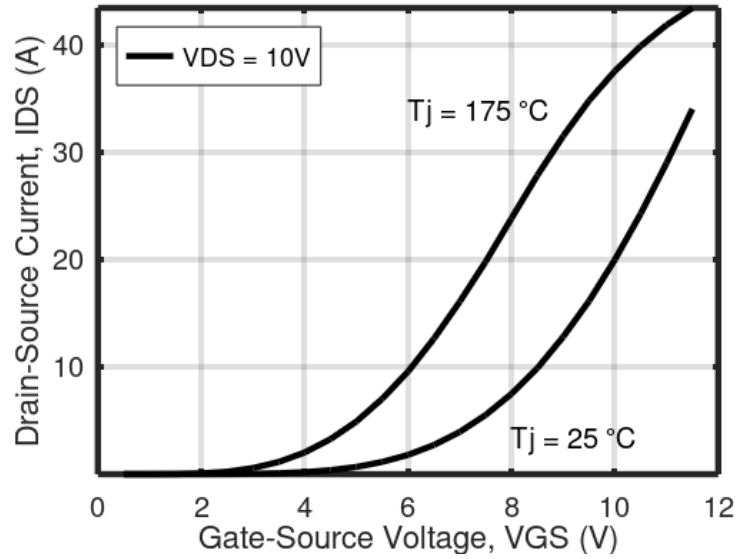


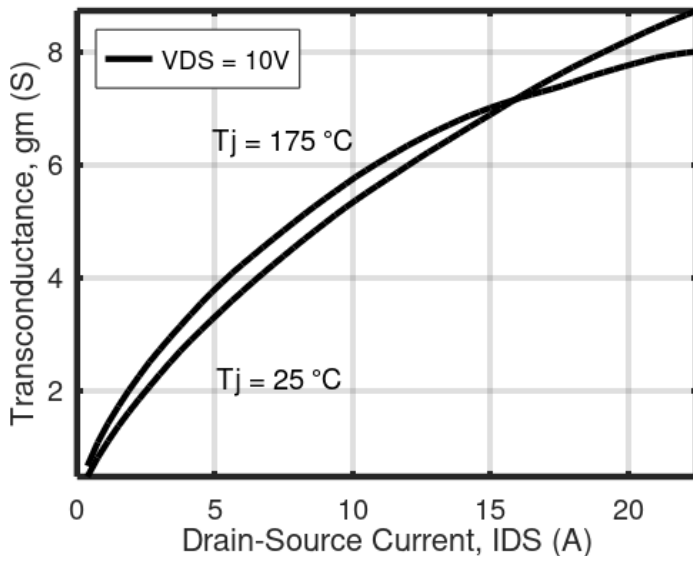
Figure 4: Drain Current vs. Threshold Voltage For Various Temperatures



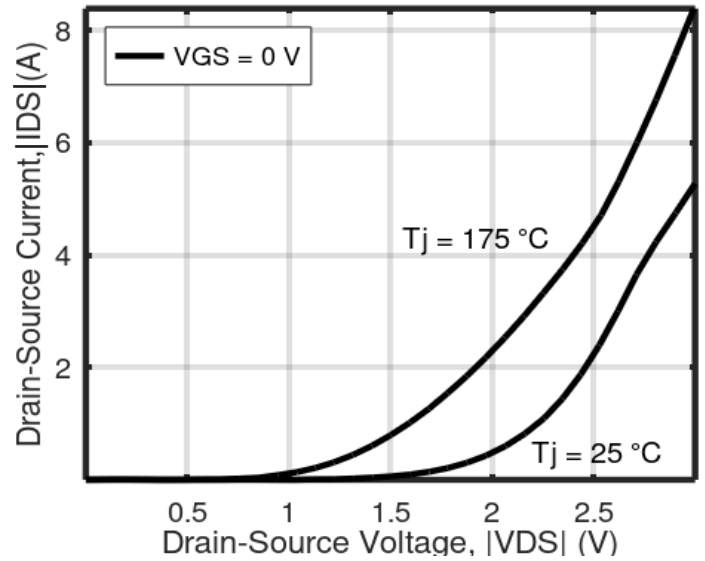
**Figure 5:** Capacitances vs. Drain-Source Voltage (0 - 200V)



**Figure 6:** Transfer Characteristic



**Figure 7:** Transconductance vs. Drain Current



**Figure 8:** Body Diode Characteristic For Various Temperatures

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

**Disclaimer:** The specifications provided are not a guarantee of component performance. It is essential to test components for their specific applications, as modifications may be required. Use of Cactus Materials components in life support systems and devices necessitates prior written approval from Cactus Materials.

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