

# TO-247-3

## SiC Power MOSFETs

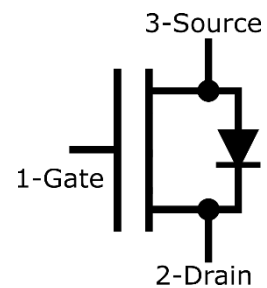
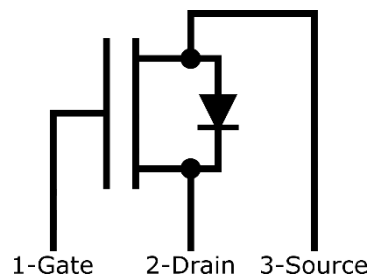
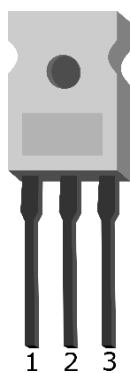
CoolCAD Power MOSFETs exceed power, efficiency and portability capabilities of standard silicon devices and are available in a variety of breakdown voltages (650V, 1200V, 1700V & 3300V) and current ratings. They have low on-resistance and low leakage in the blocking state. Fabricated on high-quality 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
CC650B3M22	TO-247-3	CoolCADElectronics

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Maximum Ratings						
*Characteristics	Symbol	Comments	Min	Typ	Max	Units
DC blocking voltage	VDSmax	TJ=25°C		650		V
Gate input voltage range	VGS	Recommended range	-5		15	V
		Dynamic	-5		18	V
Avalanche rating	VAVA	TJ=25°C		750		V
Pulsed drain current	IDpulsed	VGS=15V; VDS=2V; TJ=25°C		14		A
		VGS=15V; VDS=2V; TJ=175°C		11		A
Continuous drain current	ID	VGS=15V; TJ=25°C		10		A
		VGS=15V; TJ=175°C		8		A
Continuous drain power	P	VGS=15V; TJ=25°C		100		W
Maximum- junction temperature	TJmax	Normal operation			175	°C
		During processing / soldering			250	°C

Electrical and Thermal Characteristics						
*Characteristics	Symbol	Comments	Min	Typ	Max	Units
Gate threshold voltage	VTH	VGS=VDS; IDS=5mA; TJ=25°C		2.5		V
		VGS=VDS; IDS=5mA; TJ=175°C		1.4		V
Gate leakage	IGSS	VGS=15V; VDS=0; TJ=25°C		7.2		nA
		VGS=15V; VDS=0; TJ=175°C		47.1		nA
Drain leakage	IDSS	VDS=600V; VGS=0; TJ=25°C		2.4		nA
		VDS=600V; VGS=0; TJ=175°C		359		nA
Drain-source on-resistance	RDSON	VGS=15V; IDS=5A; TJ=25°C		123		mΩ
		VGS=15V; IDS=5A; TJ=175°C		167		mΩ
Transconductance	gm	VDS=10V; IDS=10A; TJ=25°C		5.3		S
		VDS=10V; IDS=10A; TJ=175°C		5.8		S
Input capacitance	CISS	VGS=0V; VDS=200V; f=1MHz; TJ=25°C		918		pF
Output capacitance	COSS	VGS=0V; VDS=200V; f=1MHz; TJ=25°C		142		pF
Reverse transfer capacitance	CRSS	VGS=0V; VDS=200V; f=1MHz; TJ=25°C		5.6		pF
Stored energy at output	EOSS	VGS=-5/15V; VDS=200V; f=1MHz; TJ=25°C		5.7		μJ
Turn on switching energy	EON	VGS=-5/15V; VDS=200V; f=1MHz; TJ=25°C		18.5		μJ
Turn off switching energy	EOFF	VGS=-5/15V; VDS=200V; f=1MHz; TJ=25°C		5.8		μJ
Rise time	tR	VGS=-5/15V; VDS=1kV; ID=10A; RG=0Ω; TJ=25°C		20		ns
Fall time	tF	VGS=-5/15V; VDS=1kV; ID=10A; RG=0Ω; TJ=25°C		15		ns
Turn off delay time	tD	VGS=-5/15V; VDS=200V; ID=10A; RG=0Ω; TJ=25°C		10		ns
Gate Charge	QG	VGS=-5/15V; VDS=200V; ID=10A; RG=0Ω; TJ=25°C		10		nC
Internal gate resistance	RG	f=1Mz; VAC=25mV; TJ=25°C		5		Ω
Thermal resistance:Junction to Case	RJC			1.5		°C/W

Body diode characteristics						
*Characteristics	Symbol	Comments	Min	Typ	Max	Units
Diode forward voltage	VF	IF=3A; VGS=0V TJ=25°C IF=3A; VGS=0V TJ=175°C		2.8 2.4		V
Pulsed diode current	ISpulsed	VGS=0V; VDS=-3V; TJ=25°C VGS=0V; VDS=-3V; TJ=175°C		5 8		A
Reverse recovery time	trr			2		ns
Reverse recovery charge	Qrr	VDS=0-200V; VGS=0V; T=25°C		44		nC

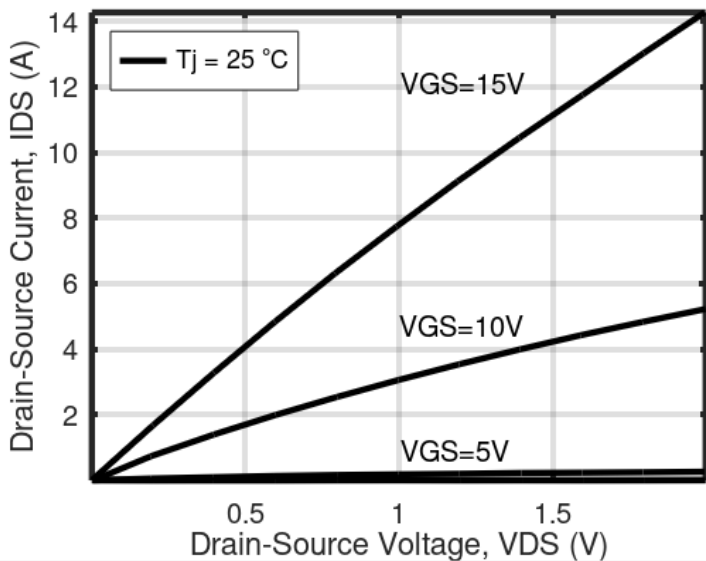


Figure 1: Output Characteristics TJ = 25 °C

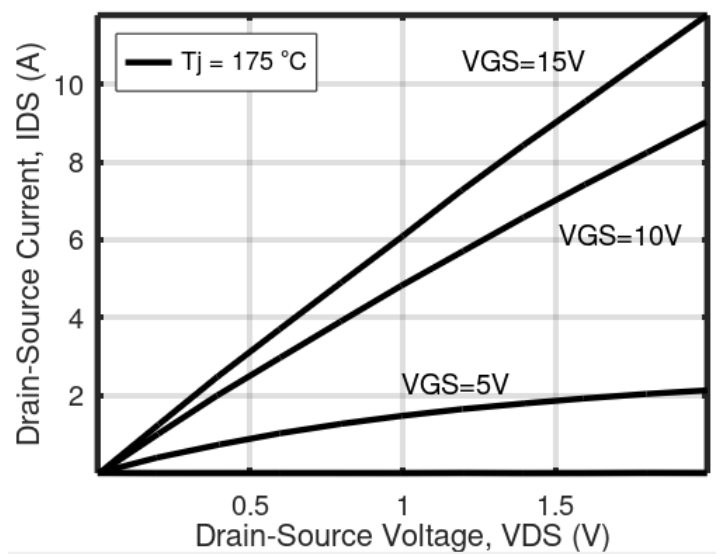


Figure 2: Output Characteristics TJ = 175 °C

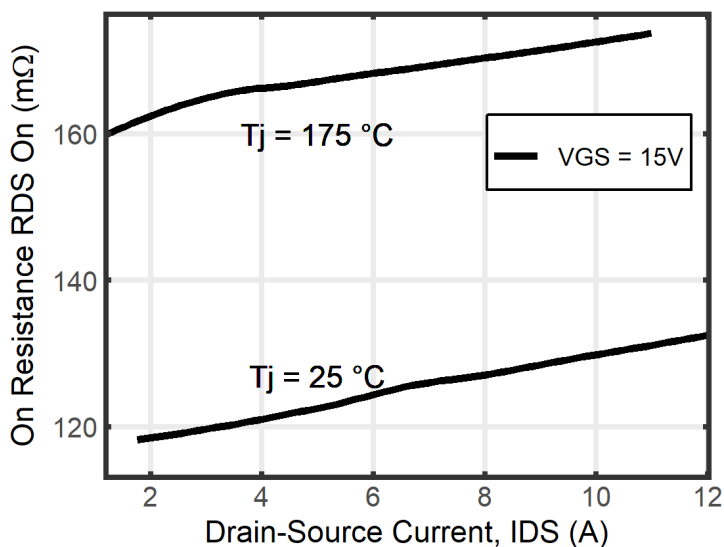


Figure 3: On-Resistance vs. Drain Current For Various Temperatures.

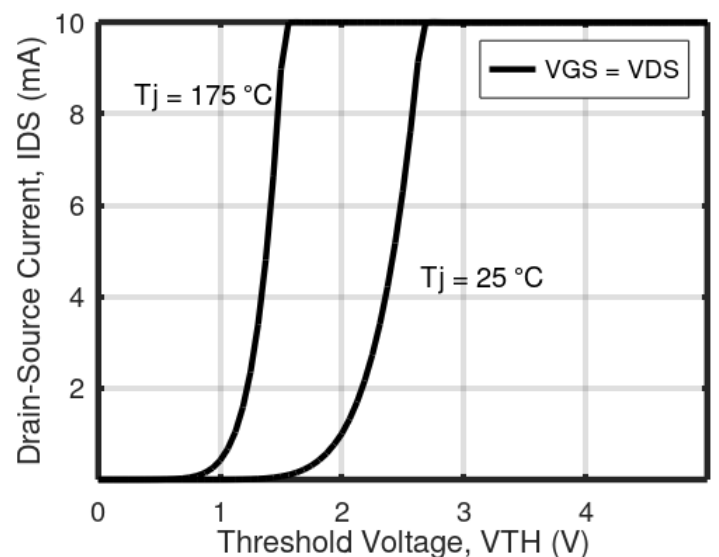


Figure 4: Drain Current vs. Threshold Voltage For Various Temperatures

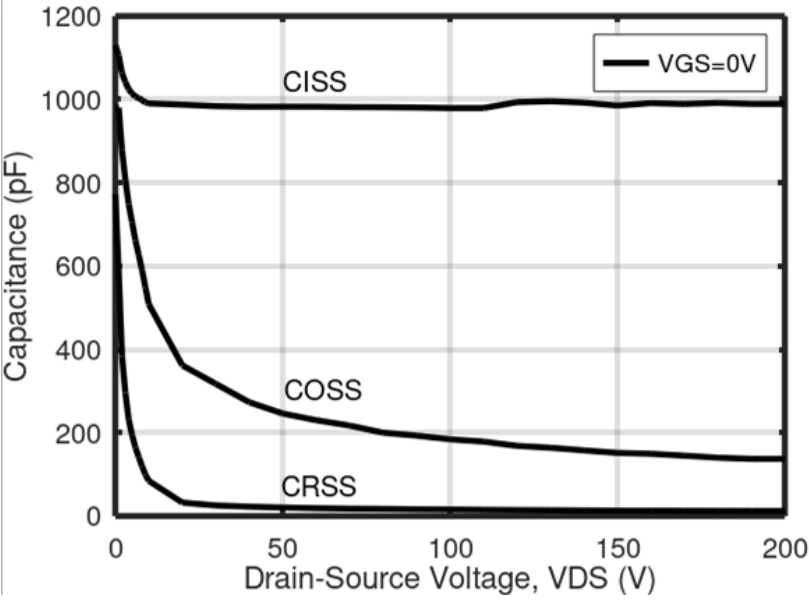


Figure 5: Capacitances vs. Drain-Source Voltage (0 - 200V)

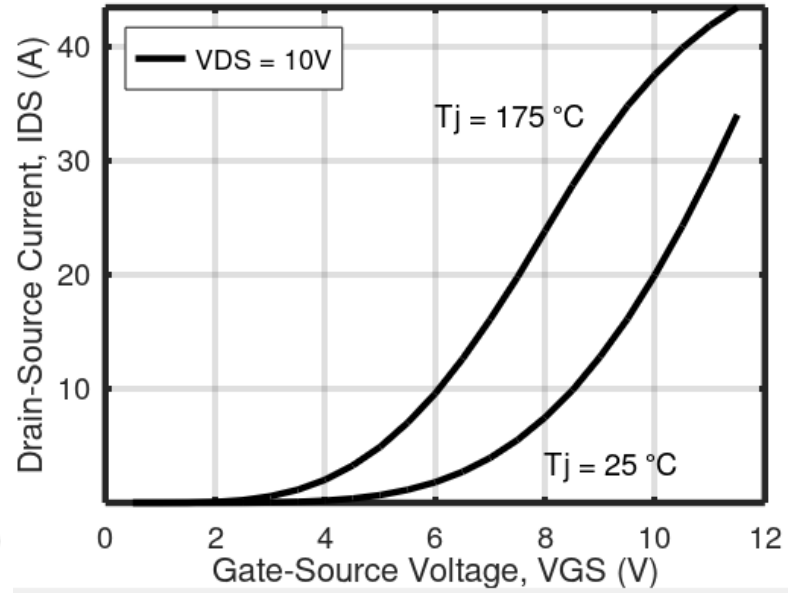


Figure 6: Transfer Characteristic

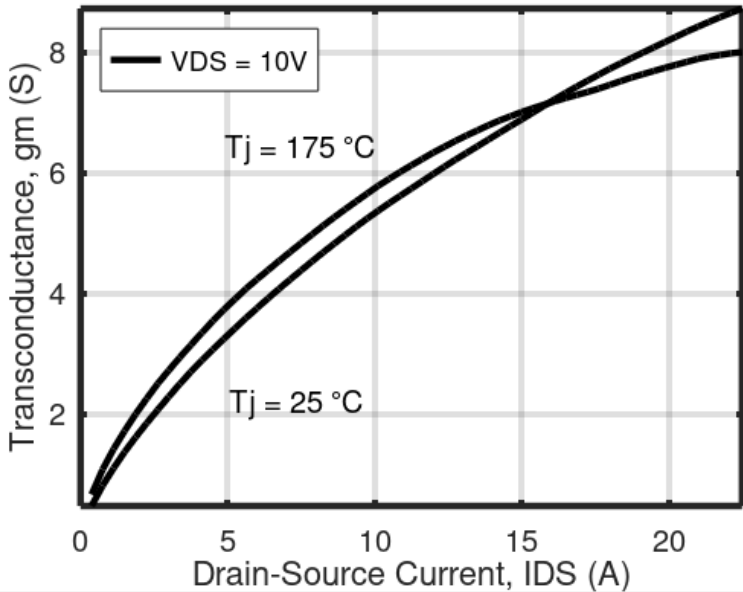


Figure 7: Transconductance vs. Drain Current

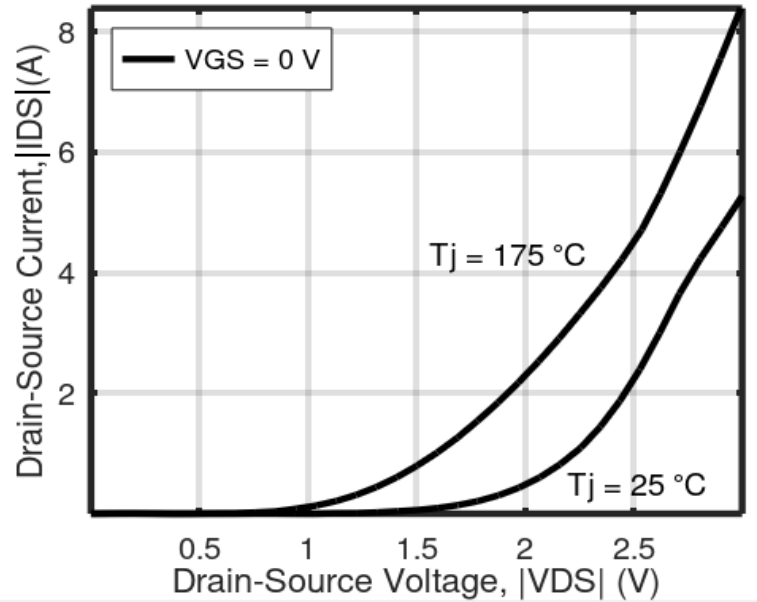


Figure 8: Body Diode Characteristic For Various Temperatures

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

**Disclaimer:** These specifications may not be considered as a guarantee of components characteristics. Components have to be tested depending on intended application as adjustments may be necessary. The use of CoolCAD Electronics components in life support appliances and systems are subject to written approval of CoolCAD Electronics.