TO-247-3

SiC Power MOSFETs

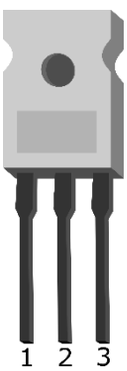
CoolCAD Power MOSFETs exceed power, efficiency and portability capabilities of standard silicon devices and are available in a variety of breakdown voltages (650V, 1200V, 1700V & 3300V) and current ratings. They have low on-resistance and low leakage in the blocking state. Fabricated on high-quality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

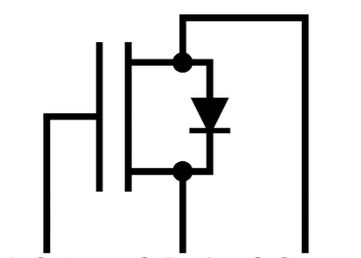
BENEFITS

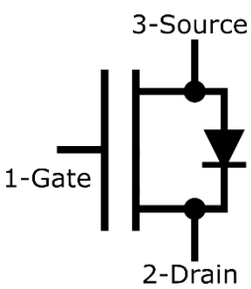
- Higher efficiency
- Reduced cooling
- Increased power
- Reduced system volume

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
CC-CN-23-0123	TO-247-3	CoolCADElectronics

Maximum Ratings

*Characteristics	Symbol	Comments	Min	Typ	Max	Units
DC blocking voltage	VDSmax	TJ=25°C to 175°C		1200		V
Gate input voltage range	VGS	Recommended range Dynamic	-5 -5		15 18	V
Avalanche rating	VAVA	VGS=0V; ID= 0.1mA; TJ=25°C VGS=0V; ID= 0.1mA; TJ=175°C	1200 1200	1388 1425		V
Pulsed drain current	IDpulsed	VGS=15V; TJ=25°C VGS=15V; TJ=175°C		20 14		A
Continuous drain current	ID	VGS=15V; TJ=25°C VGS=15V; TJ=175°C		18 12		A
Continuous drain power	P	VGS=15V; TJ=25°C		100		W
Maximum- junction temperature	TJmax	Normal operation During processing / soldering			175 250	°C

Electrical and Thermal Characteristics

*Characteristics	Symbol	Comments	Min	Typ	Max	Units
Gate threshold voltage	V_{TH}	VGS=VDS; IDS=5mA; TJ=25°C VGS=VDS; IDS=5mA; TJ=175°C		2.4 1.3		V
Gate leakage	I_{GSS}	VGS=15V; VDS=0; TJ=25°C VGS=15V; VDS=0; TJ=175°C		45 80		pA
Drain leakage	I_{DSS}	VDS=1000V; VGS=0; TJ=25°C VDS=1000V; VGS=0; TJ=175°C		4.5 5.5		nA µA
Drain-source on-resistance	R_{DSON}	VGS=15V; IDS=5A; TJ=25°C VGS=15V; IDS=5A; TJ=175°C		83 133		mΩ
Transconductance	Gm	VDS=10V; IDS=20A; TJ=25°C VDS=10V; IDS=20A; TJ=175°C		9 8.6		S
Input capacitance	C_{ISS}	VGS=0V; VDS=200V; f=1MHz; TJ=25°C		810		pF
Output capacitance	C_{OSS}	VGS=0V; VDS=200V; f=1MHz; TJ=25°C		108		pF
Reverse transfer capacitance	C_{RSS}	VGS=0V; VDS=200V; f=1MHz; TJ=25°C		19		pF
Stored energy at output	E_{OSS}	VGS=-5/15V; VDS=200V; f=1MHz; TJ=25°C		4.3		µJ
Turn on switching energy	E_{ON}	VGS=-5/15V; VDS=200V; f=1MHz; TJ=25°C		16.6		µJ
Turn off switching energy	E_{OFF}	VGS=-5/15V; VDS=200V; f=1MHz; TJ=25°C		4.8		µJ
Rise time	tR	VGS=-5/15V; VDS=1kV; ID=10A; RG=0Ω; TJ=25°C		15		ns
Fall time	tF	VGS=-5/15V; VDS=1kV; ID=10A; RG=0Ω; TJ=25°C		10		ns
Turn off delay time	tD	VGS=-5/15V; VDS=200V; ID=10A; RG=0Ω; TJ=25°C		17		ns
Gate Charge	Q_G	VGS=-5/15V; VDS=200V; ID=10A; RG=0Ω; TJ=25°C		16		nC
Internal gate resistance	R_G	f=1Mz; VAC=25mV; TJ=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	VF	IF=3A; VGS=0V TJ=25°C IF=3A; VGS=0V TJ=175°C		2.6 2.1		V
Pulsed diode current	IS_{pulsed}	VGS=0V; VDS=-3V; TJ=25°C VGS=0V; VDS=-3V; TJ=175°C		5.8 8.9		A
Reverse recovery time	trr	VDS=0-200V; VGS=0V; T=25°C		7		ns
Reverse recovery charge	Qrr	VDS=0-200V; VGS=0V; T=25°C		28.9		nC

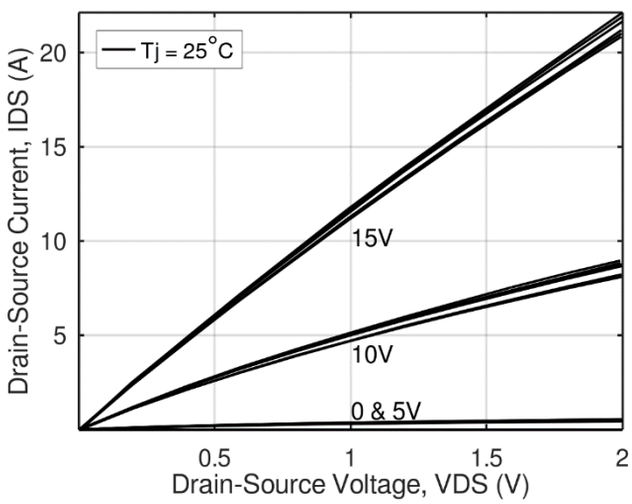


Figure 1: Room temperature output characteristics. VGS = 0, 5, 10, 15V; TJ = 25ºC.

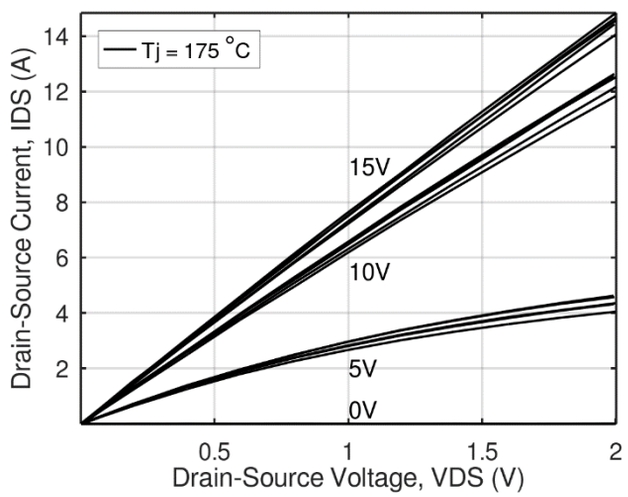


Figure 2: High temperature output characteristics. VGS = 0, 5, 10, 15V; TJ = 175ºC.

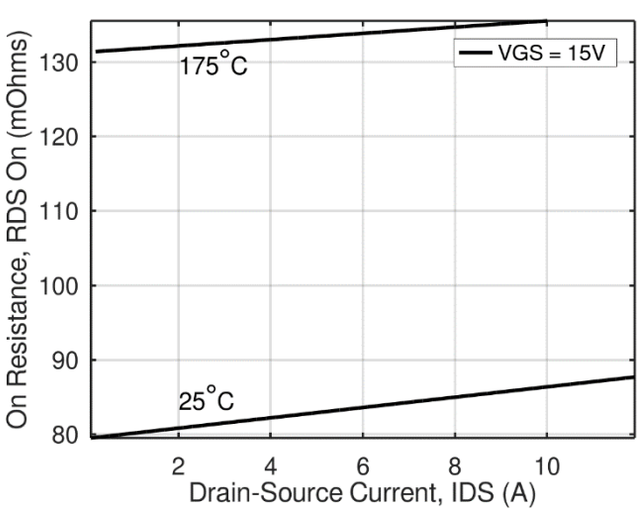


Figure 3: On-Resistance vs. Drain Current. TJ = 25, 175ºC.

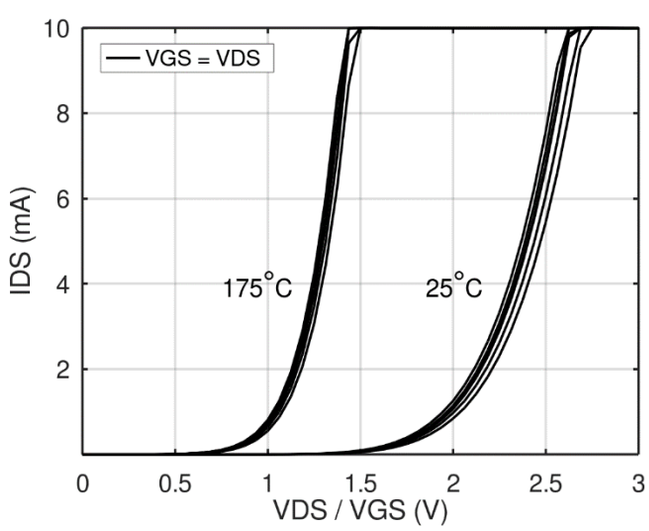


Figure 4: Drain Current vs. Threshold Voltage. TJ = 25, 175ºC.

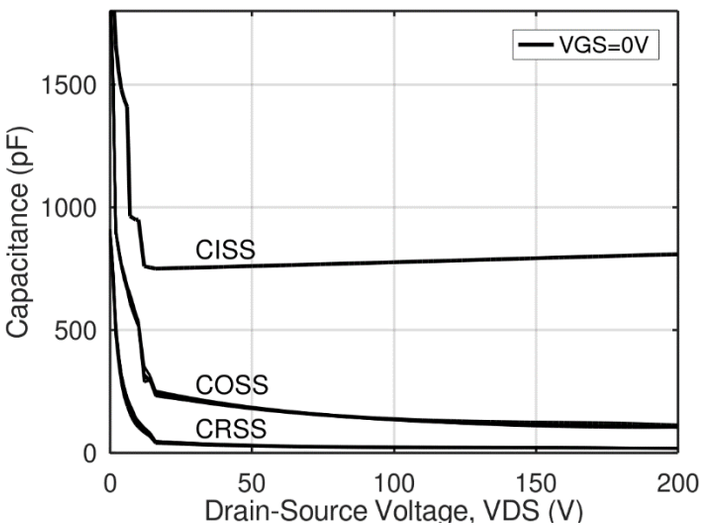


Figure 5: Capacitances vs. Drain-Source Voltage.
TJ = 25.

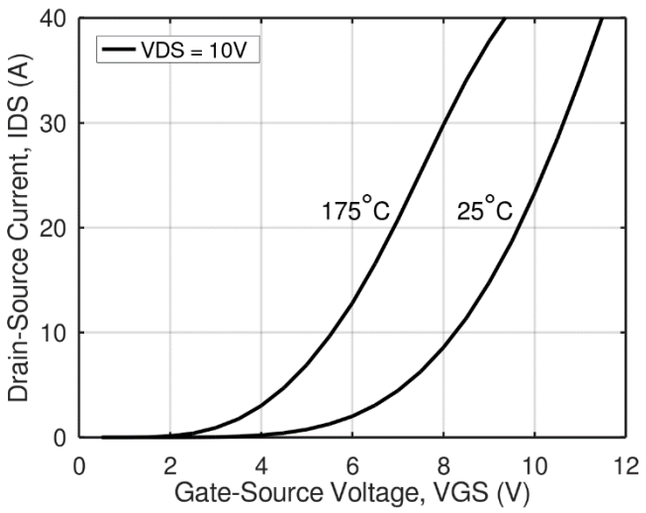


Figure 6: Transfer Characteristics.
TJ = 25, 175ºC.

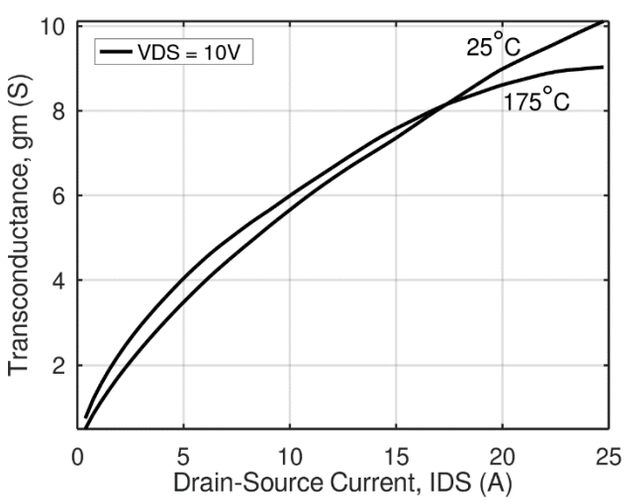


Figure 7: Transconductance vs. Drain Current.
TJ = 25, 175ºC.

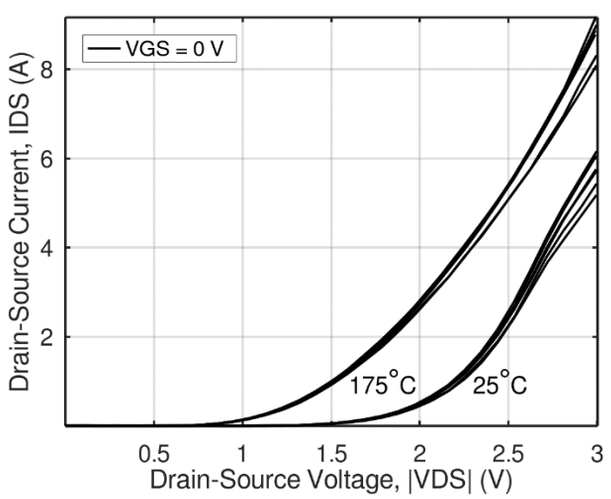


Figure 8: Body Diode Characteristics.
TJ = 25, 175ºC.

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.

CoolCAD Electronics reserves the right to change without notice the specifications and information contained within.

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