# TO-247-3

**SiC Power MOSFETs**

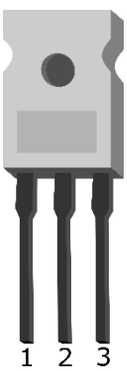
CoolCAD Power MOSFETs exceed power, efficiency and portability capabilities of standard silicon devices and are available in a variety of breakdown voltages (650V, 1200V, 1700V & 3300V) and current ratings. They have low on-resistance and low leakage in the blocking state. Fabricated on high-quality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

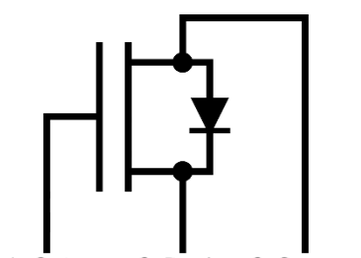
## BENEFITS

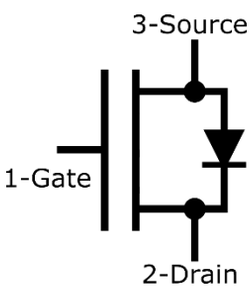
- Higher efficiency
- Reduced cooling
- Increased power
- Reduced system volume

## 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-C2-B15-0322 | TO-247-3 | CoolCADElectronics |

Maximum Ratings

| *Characteristics | Symbol | Comments | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| DC blocking voltage | VDSmax | TJ=25°C | | 1200 | | V |
| Gate input voltage range | VGS | Recommended range | -5 | | 15 | V |
| | | Dynamic | -5 | | 18 | |
| Avalanche rating | VAVA | TJ=25°C | 1200 | 1500 | | V |
| Pulsed drain current | IDpulsed | VGS=15V; TJ=25°C | | 13 | | A |
| | | VGS=15V; TJ=175°C | | 11.5 | | |
| Continuous drain current | ID | VGS=15V; TJ=25°C | | 10 | | A |
| | | VGS=15V; TJ=175°C | | 8.5 | | |
| Continuous drain power | P | VGS=15V; TJ=25°C | | 100 | | W |
| Maximum- junction temperature | TJmax | Normal operation | | | 175 | °C |
| | | During processing / soldering | | | 250 | |

Electrical and Thermal Characteristics

| *Characteristics | Symbol | Comments | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| Gate threshold voltage | VTH | VGS=VDS; IDS=5mA; TJ=25°C | | 3.2 | | V |
| | | VGS=VDS; IDS=5mA; TJ=175°C | | 2.2 | | |
| Gate leakage | IGSS | VGS=15V; VDS=0; TJ=25°C | | 16 | | pA |
| | | VGS=15V; VDS=0; TJ=175°C | | 600 | | |
| Drain leakage | IDSS | VDS=1.2kV; VGS=0; TJ=25°C | | 10 | | nA |
| | | VDS=1.2kV; VGS=0; TJ=175°C | | 200 | | |
| Drain-source on-resistance | RDSON | VGS=15V; IDS=8A; TJ=25°C | | 131 | | mΩ |
| | | VGS=15V; IDS=8A; TJ=175°C | | 168 | | |
| Transconductance | gm | VDS=10V; IDS=10A; TJ=25°C | | 4.3 | | S |
| | | VDS=10V; IDS=10A; TJ=175°C | | 4.5 | | |
| Input capacitance | CISS | VGS=0V; VDS=200V; f=1MHz; TJ=25°C | | 1807 | | pF |
| Output capacitance | COSS | VGS=0V; VDS=200V; f=1MHz; TJ=25°C | | 123 | | pF |
| Reverse transfer capacitance | CRSS | VGS=0V; VDS=200V; f=1MHz; TJ=25°C | | 18 | | pF |
| Stored energy at output | EOSS | VDS=200V; f=1MHz; TJ=25°C | | 5 | | µJ |
| Turn on switching energy | EON | VGS=-5/15V; VDS=200V; f=1MHz; TJ=25°C | | 37 | | µJ |
| Turn off switching energy | EOFF | VGS=-5/15V; VDS=200V; f=1MHz; TJ=25°C | | 6 | | 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=1kV; ID=10A; RG=0Ω; TJ=25°C | | 40 | | ns |
| Gate Charge | QG | VGS=-5/15V; VDS=1kV; ID=10A; RG=0Ω; TJ=25°C | | 40 | | 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<br>IF=3A; VGS=0V TJ=175°C | | 3<br>2.6 | | V |
| Pulsed diode current | $IS_{pulsed}$ | VGS=0V; VDS=-3V; TJ=25°C<br>VGS=0V; VDS=-3V; TJ=175°C | | 3<br>5.5 | | A |
| | | | | | | |
| Reverse recovery time | trr | | | | | ns |
| Reverse recovery charge | Qrr | VDS=0-200V; VGS=0V; T=25°C | | 34 | | nC |

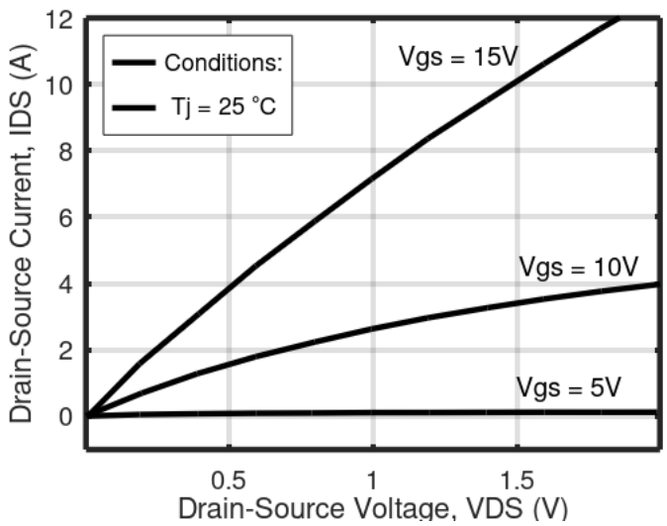



Figure 1: Output Characteristics TJ = 25 ºC

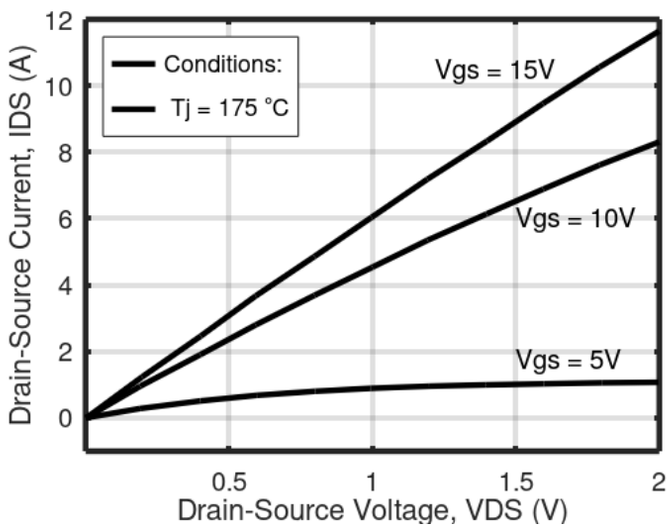



Figure 2: Output Characteristics TJ = 175 ºC

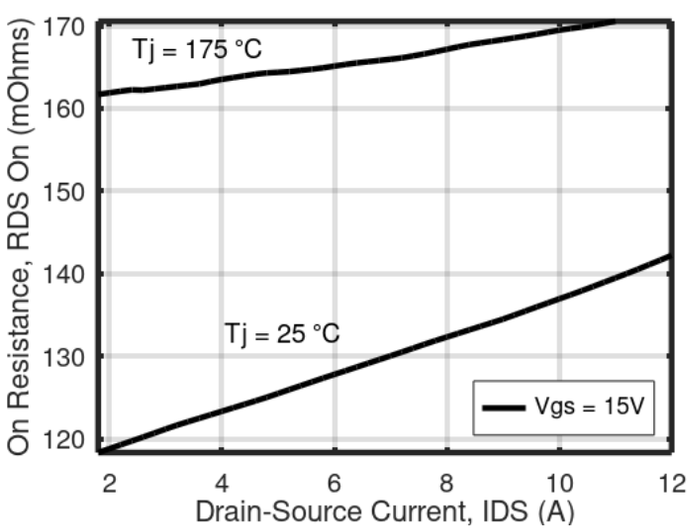



Figure 3: On-Resistance vs. Drain Current For Various Temperatures

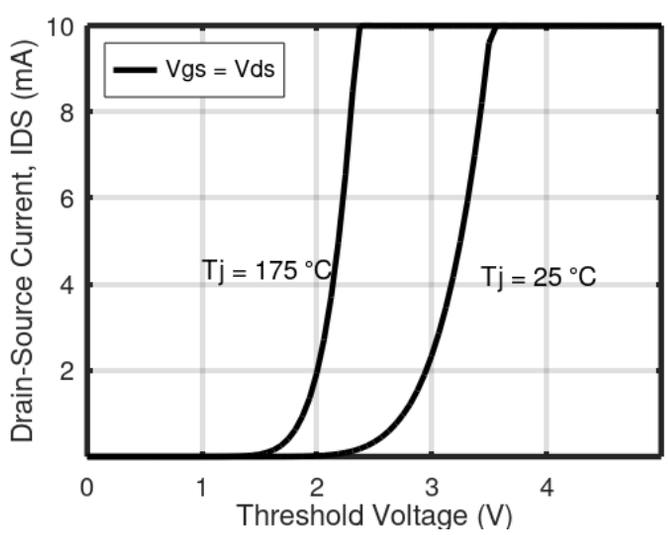



Figure 4: Drain Current vs. Threshold Voltage For Various Temperatures

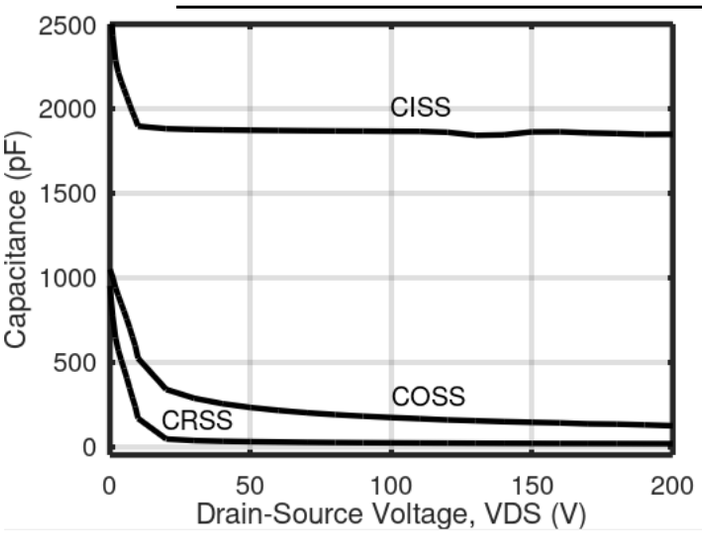



Figure 5: Capacitances vs. Drain-Source Voltage (0 - 200V)

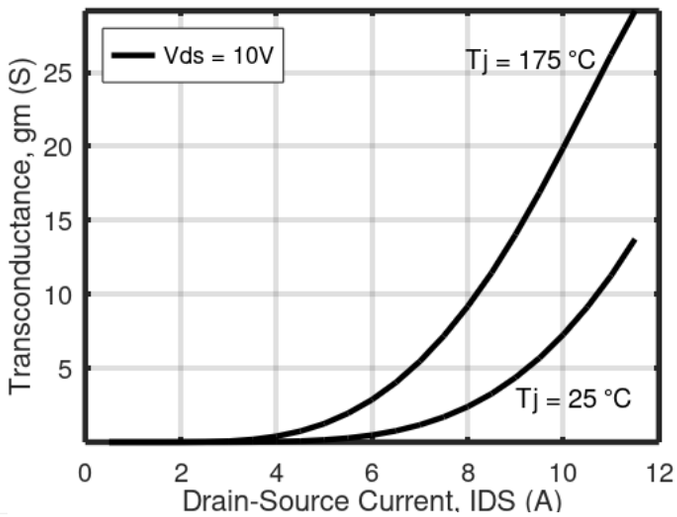



Figure 6: Transfer Characteristic For Various Temperatures

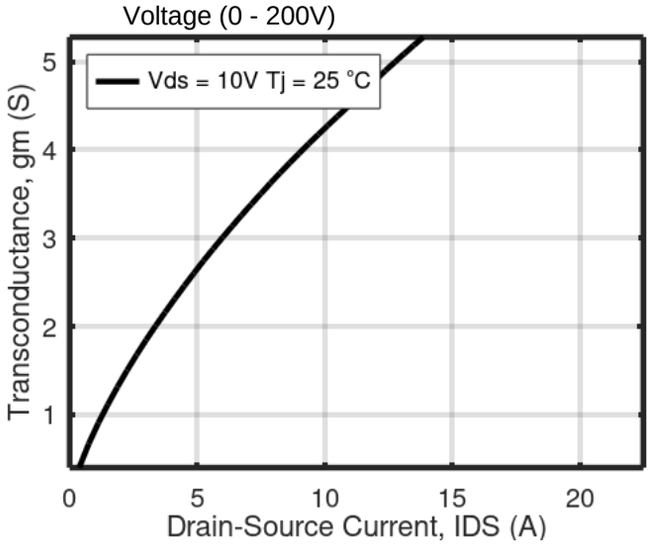



Figure 7: Transconductance vs. Drain Current For Room Temperature

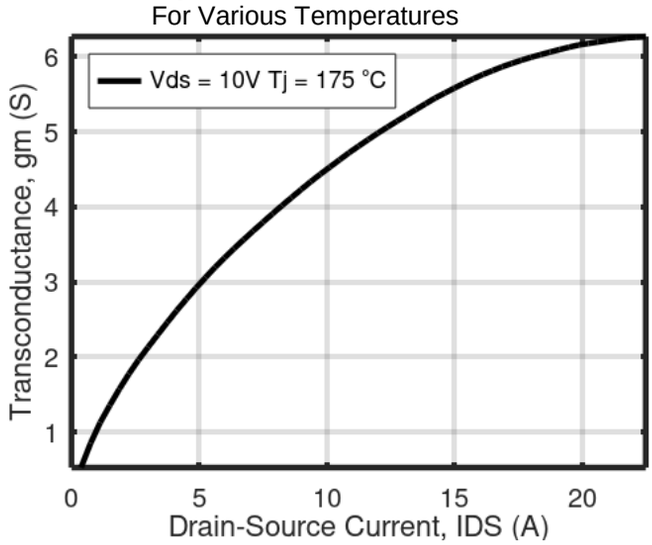



Figure 8: Transconductance vs. Drain Current For High Temperature

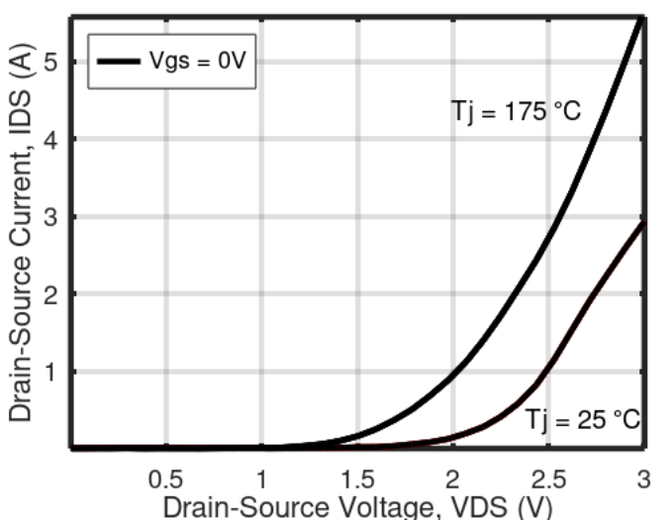



Figure 9: Body Diode Characteristic For Various Temperatures

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





contact@coolcadelectronics.com College Park, Maryland https://coolcadelectronics.com