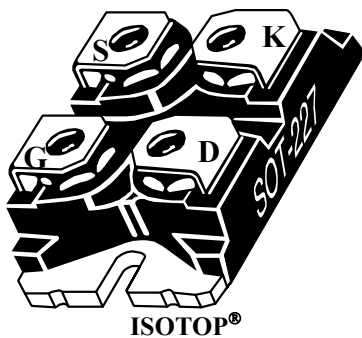
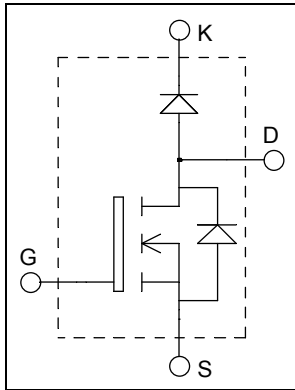


**ISOTOP® Boost chopper
SiC MOSFET + SiC chopper diode
Power module**

$V_{DSS} = 1200V$
 $R_{DS(on)} = 34m\Omega \text{ max @ } T_j = 25^\circ C$
 $I_D = 71A \text{ @ } T_c = 25^\circ C$



Application

- AC and DC motor control
- Switched Mode Power Supplies
- Power Factor Correction
- Brake switch

Features

- **SiC Power MOSFET**
 - Low $R_{DS(on)}$
 - High temperature performance
- **SiC Schottky Diode**
 - Zero reverse recovery
 - Zero forward recovery
 - Temperature Independent switching behavior
 - Positive temperature coefficient on VF
- ISOTOP® Package (SOT-227)
- Very low stray inductance
- High level of integration

Benefits

- Outstanding performance at high frequency operation
- Stable temperature behavior
- Very rugged
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive TC of V_{CEsat}
- RoHS Compliant

All ratings @ $T_j = 25^\circ C$ unless otherwise specified

Absolute maximum ratings

| Symbol | Parameter | Max ratings | Unit |
|--------------|----------------------------------|------------------------|------------|
| V_{DSS} | Drain - Source Breakdown Voltage | 1200 | V |
| I_D | Continuous Drain Current | $T_c = 25^\circ C$ | 71 |
| | | $T_c = 80^\circ C$ | 54 |
| I_{DM} | Pulsed Drain current | 140 | |
| V_{GS} | Gate - Source Voltage | -10/+25 | V |
| $R_{DS(on)}$ | Drain - Source ON Resistance | 34 | m Ω |
| P_D | Maximum Power Dissipation | $T_c = 25^\circ C$ 300 | W |

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on www.microsemi.com

Electrical Characteristics

| <i>Symbol</i> | <i>Characteristic</i> | <i>Test Conditions</i> | <i>Min</i> | <i>Typ</i> | <i>Max</i> | <i>Unit</i> |
|---------------|---------------------------------|-------------------------------|---------------------|------------|------------|-------------|
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{GS} = 0V, V_{DS} = 1200V$ | | 12 | 100 | μA |
| $R_{DS(on)}$ | Drain – Source on Resistance | $V_{GS} = 20V$ $I_D = 50A$ | $T_j = 25^\circ C$ | 25 | 34 | m Ω |
| | | | $T_j = 150^\circ C$ | 43 | 63 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS} = V_{DS}, I_D = 1mA$ | 1.9 | 2.3 | | V |
| I_{GSS} | Gate – Source Leakage Current | $V_{GS} = 20V, V_{DS} = 0V$ | | | 0.5 | μA |

Dynamic Characteristics

| <i>Symbol</i> | <i>Characteristic</i> | <i>Test Conditions</i> | <i>Min</i> | <i>Typ</i> | <i>Max</i> | <i>Unit</i> |
|---------------|-------------------------------------|--|---------------------|---------------------|------------|--------------|
| C_{iss} | Input Capacitance | $V_{GS} = 0V$ $V_{DS} = 1000V$ $f = 1MHz$ | | 2980 | | pF |
| C_{oss} | Output Capacitance | | | 220 | | |
| C_{rss} | Reverse Transfer Capacitance | | | 23 | | |
| Q_g | Total gate Charge | $V_{GS} = 20V$ $V_{Bus} = 800V$ $I_D = 50A$ | | 179 | | nC |
| Q_{gs} | Gate – Source Charge | | | 32 | | |
| Q_{gd} | Gate – Drain Charge | | | 63 | | |
| $T_{d(on)}$ | Turn-on Delay Time | $V_{GS} = -2/+20V$ $V_{Bus} = 800V$ $I_D = 50A$ $R_L = 16\Omega; R_G = 20\Omega$ | | 21 | | ns |
| T_r | Rise Time | | | 19 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | 50 | | |
| T_f | Fall Time | | | 30 | | |
| E_{on} | Turn on Energy | Inductive Switching $V_{GS} = -5/+20V$ $V_{Bus} = 600V$ $I_D = 50A$ $R_G = 20\Omega$ | $T_j = 150^\circ C$ | 1.1 | | mJ |
| E_{off} | Turn off Energy | | | $T_j = 150^\circ C$ | 0.6 | |
| R_{thJC} | Junction to Case Thermal Resistance | | | | 0.42 | $^\circ C/W$ |

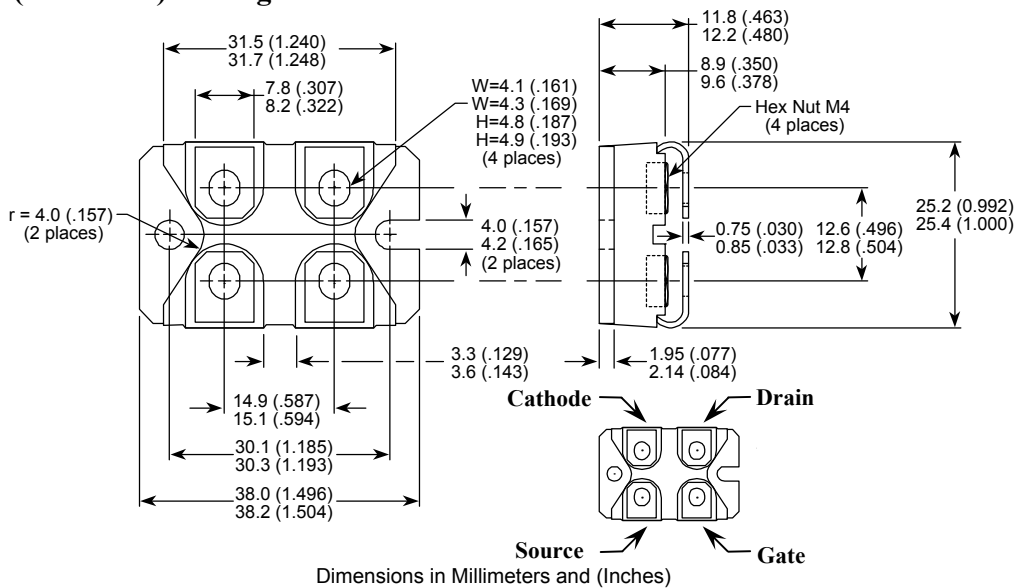
SiC chopper diode ratings and characteristics

| <i>Symbol</i> | <i>Characteristic</i> | <i>Test Conditions</i> | <i>Min</i> | <i>Typ</i> | <i>Max</i> | <i>Unit</i> |
|---------------|---|---|---------------------|------------|------------|--------------|
| V_{RRM} | Maximum Peak Repetitive Reverse Voltage | | 1200 | | | V |
| I_{RM} | Maximum Reverse Leakage Current | $V_R = 1200V$ | $T_j = 25^\circ C$ | 64 | 400 | μA |
| | | | $T_j = 175^\circ C$ | 112 | 2000 | |
| I_F | DC Forward Current | | | 20 | | A |
| V_F | Diode Forward Voltage | $I_F = 20A$ | $T_j = 25^\circ C$ | 1.6 | 1.8 | V |
| | | | $T_j = 175^\circ C$ | 2.3 | 3 | |
| Q_C | Total Capacitive Charge | $I_F = 20A, V_R = 1200V$ $di/dt = 1000A/\mu s$ | | 160 | | nC |
| C | Total Capacitance | $f = 1MHz, V_R = 200V$ | | 192 | | pF |
| | | $f = 1MHz, V_R = 400V$ | | 138 | | |
| R_{thJC} | Junction to Case Thermal Resistance | | | | 0.8 | $^\circ C/W$ |

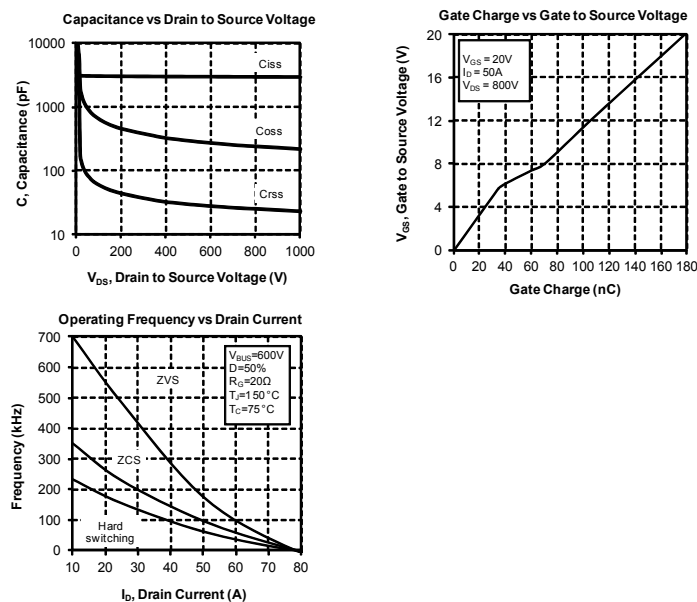
Thermal and package characteristics

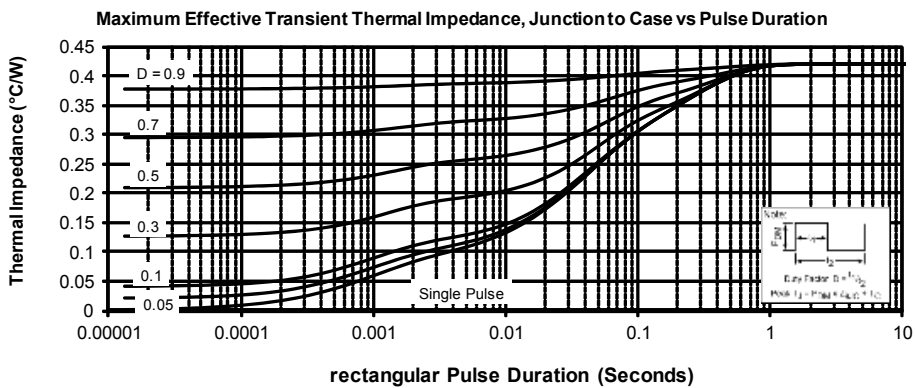
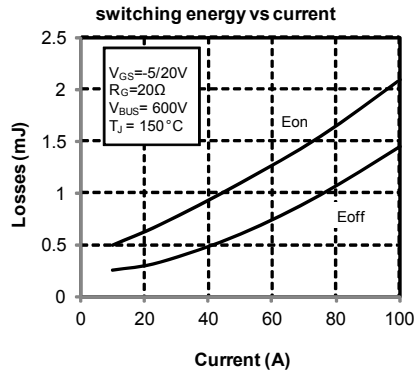
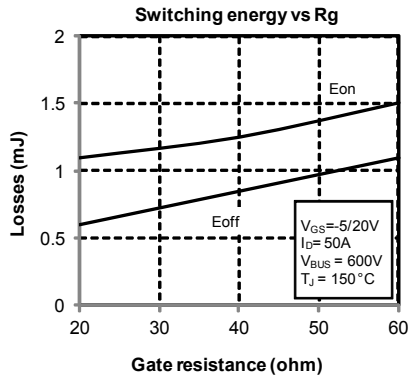
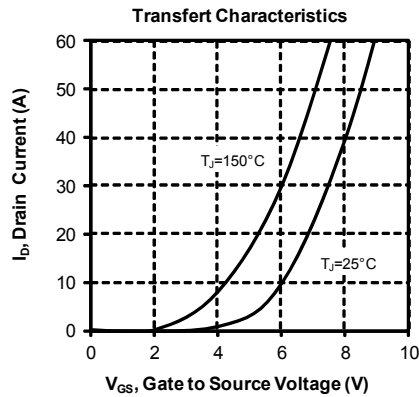
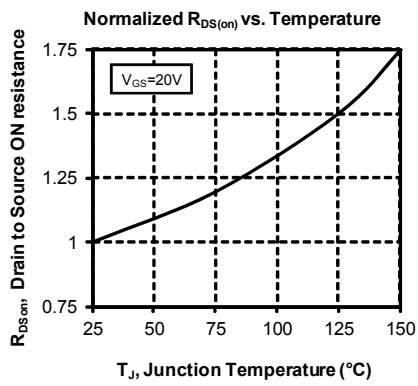
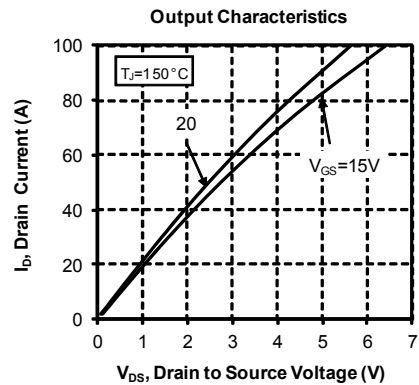
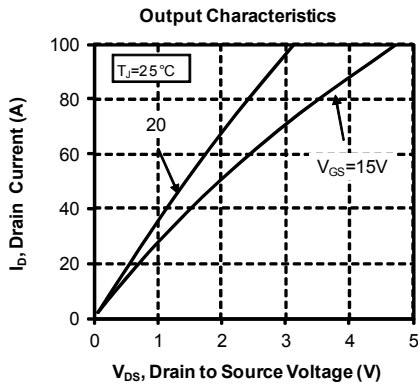
| Symbol | Characteristic | Min | Typ | Max | Unit |
|-------------------|--|------------|------|--------------------------|------|
| R _{thJA} | Junction to Ambient (IGBT & Diode) | | | 20 | °C/W |
| V _{ISOL} | RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz | 2500 | | | V |
| T _{STG} | Storage Temperature Range | -40 | | 150 | °C |
| T _J | Operating junction temperature range | SiC MOSFET | -40 | 150 | |
| | | SiC diode | -40 | 175 | |
| T _{JOP} | Recommended junction temperature under switching conditions | -40 | | T _{Jmax} -25 | |
| Torque | Terminals and mounting screws | | | 1.1 | N.m |
| Wt | Package Weight | | 29.2 | | g |

SOT-227 (ISOTOP®) Package Outline



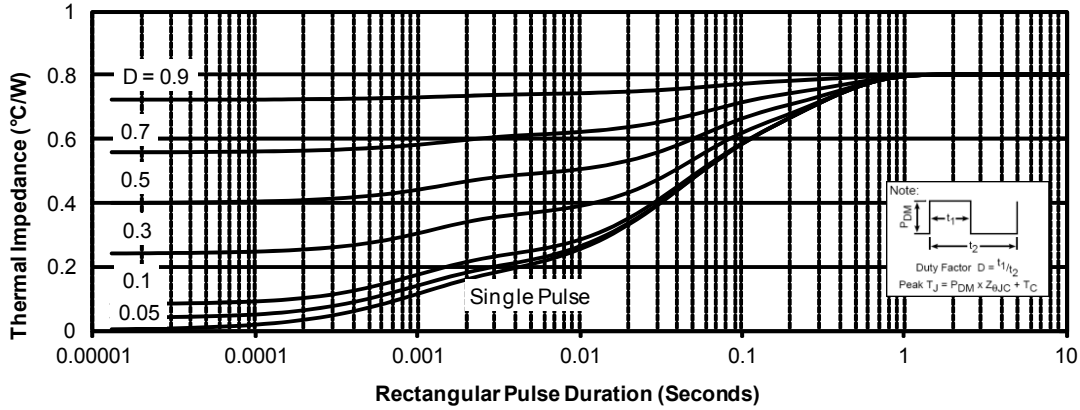
Typical Mosfet Performance Curve



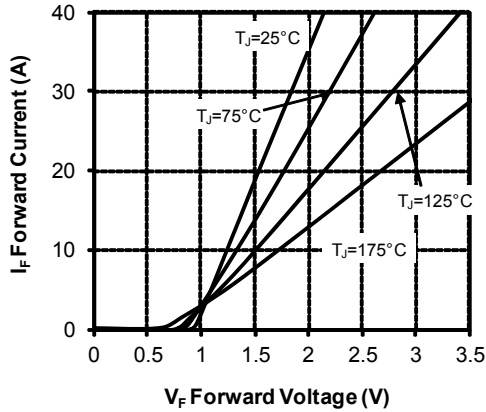


Typical SiC Diode Performance Curve

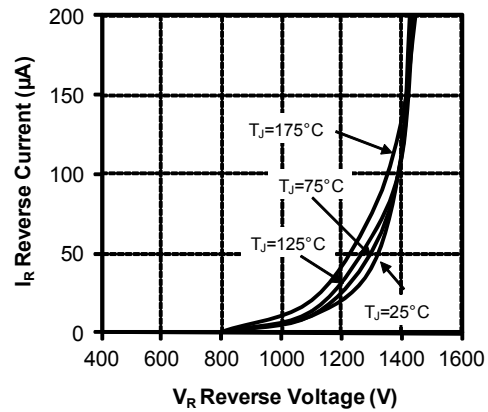
Maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration



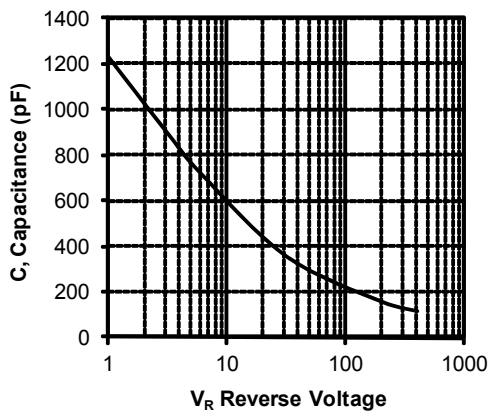
Forward Characteristics



Reverse Characteristics



Capacitance vs. Reverse Voltage



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