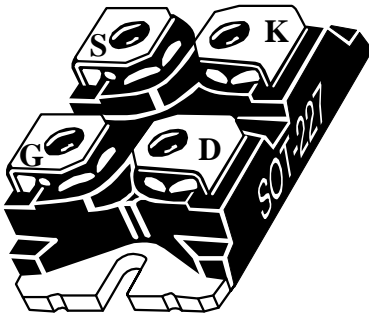
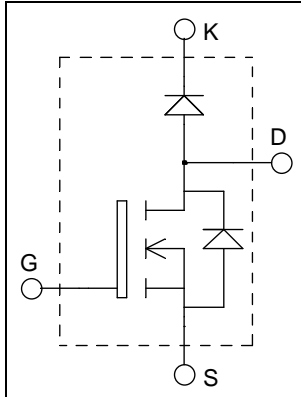


## ISOTOP<sup>®</sup> Boost chopper MOSFET Power Module

$V_{DSS} = 500V$   
 $R_{DSon} = 65m\Omega \text{ Max @ } T_j = 25^\circ C$   
 $I_D = 58A \text{ @ } T_c = 25^\circ C$



### Application

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

### Features

- Power MOS 8<sup>TM</sup> MOSFETs
  - Low  $R_{DSon}$
  - Low input and Miller capacitance
  - Low gate charge
  - Avalanche energy rated
  - Very rugged
- ISOTOP<sup>®</sup> 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

### Absolute maximum ratings

| Symbol     | Parameter   | Max ratings        | Unit       |
|------------|---|--------------------|------------|
| $V_{DSS}$  | Drain - Source Breakdown Voltage                  | 500                | V          |
| $I_D$      | Continuous Drain Current                          | $T_c = 25^\circ C$ | 58         |
|            |   | $T_c = 80^\circ C$ | 43         |
| $I_{DM}$   | Pulsed Drain current                              | 270                |            |
| $V_{GS}$   | Gate - Source Voltage                             | $\pm 30$           | V          |
| $R_{DSon}$ | Drain - Source ON Resistance                      | 65                 | m $\Omega$ |
| $P_D$      | Maximum Power Dissipation                         | $T_c = 25^\circ C$ | 543        |
| $I_{AR}$   | Avalanche current (repetitive and non repetitive) | 42                 | A          |

 **CAUTION:** These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed.

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

**Electrical Characteristics**

| Symbol       | Characteristic                  | Test Conditions                                | Min                       | Typ | Max       | Unit             |               |
|--------------|---------------------------------|--|---------------------------|-----|-----------|------------------|---------------|
| $I_{DSS}$    | Zero Gate Voltage Drain Current | $V_{DS} = 500\text{V}$<br>$V_{GS} = 0\text{V}$ | $T_j = 25^\circ\text{C}$  |     |           | 250              | $\mu\text{A}$ |
|              |                                 |  | $T_j = 125^\circ\text{C}$ |     |           | 1000             |               |
| $R_{DS(on)}$ | Drain – Source on Resistance    | $V_{GS} = 10\text{V}, I_D = 42\text{A}$        |                           |     | 65        | $\text{m}\Omega$ |               |
| $V_{GS(th)}$ | Gate Threshold Voltage          | $V_{GS} = V_{DS}, I_D = 2.5\text{mA}$          | 3                         | 4   | 5         | V                |               |
| $I_{GSS}$    | Gate – Source Leakage Current   | $V_{GS} = \pm 30\text{V}$                      |                           |     | $\pm 100$ | nA               |               |

**Dynamic Characteristics**

| Symbol       | Characteristic               | Test Conditions   | Min | Typ   | Max | Unit        |
|--------------|------------------------------|---|-----|-------|-----|-------------|
| $C_{iss}$    | Input Capacitance            | $V_{GS} = 0\text{V}$<br>$V_{DS} = 25\text{V}$<br>$f = 1\text{MHz}$  |     | 10800 |     | $\text{pF}$ |
| $C_{oss}$    | Output Capacitance           |   |     | 1164  |     |             |
| $C_{rss}$    | Reverse Transfer Capacitance |   |     | 148   |     |             |
| $Q_g$        | Total gate Charge            | $V_{GS} = 10\text{V}$<br>$V_{Bus} = 250\text{V}$<br>$I_D = 42\text{A}$  |     | 340   |     | nC          |
| $Q_{gs}$     | Gate – Source Charge         |   |     | 75    |     |             |
| $Q_{gd}$     | Gate – Drain Charge          |   |     | 155   |     |             |
| $T_{d(on)}$  | Turn-on Delay Time           | <b>Resistive switching @ <math>25^\circ\text{C}</math></b><br>$V_{GS} = 15\text{V}$<br>$V_{Bus} = 333\text{V}$<br>$I_D = 42\text{A}$<br>$R_G = 2.2\Omega$ |     | 60    |     | ns          |
| $T_r$        | Rise Time                    |   |     | 70    |     |             |
| $T_{d(off)}$ | Turn-off Delay Time          |   |     | 155   |     |             |
| $T_f$        | Fall Time                    |   |     | 50    |     |             |

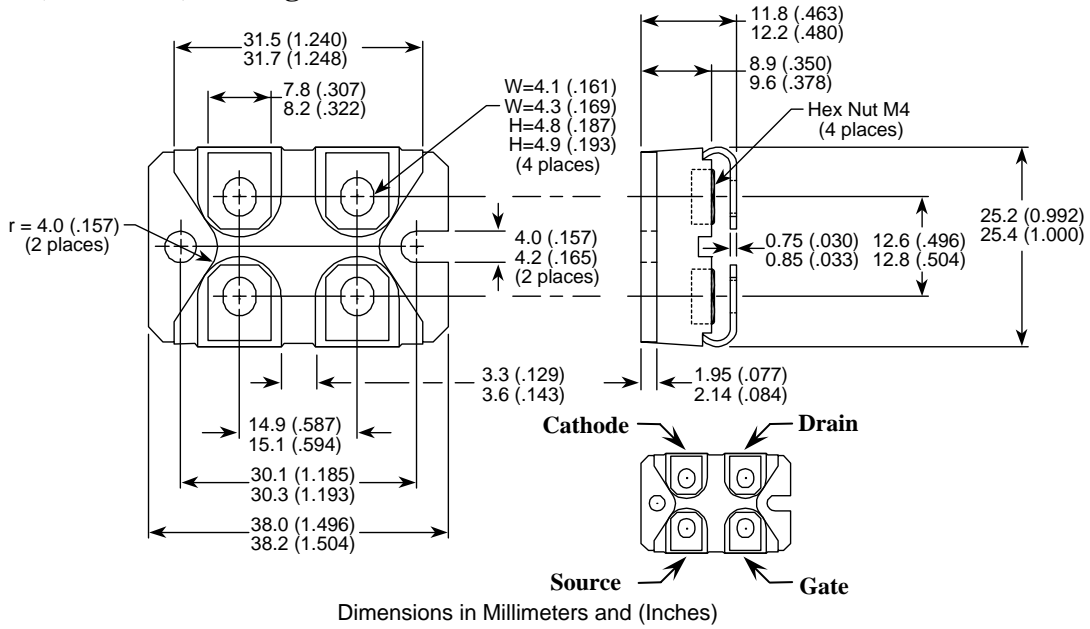
**Chopper diode ratings and characteristics**

| Symbol    | Characteristic                          | Test Conditions  | Min                       | Typ | Max | Unit |               |
|-----------|---|--|---------------------------|-----|-----|------|---------------|
| $V_{RRM}$ | Maximum Peak Repetitive Reverse Voltage |  | 600                       |     |     | V    |               |
| $I_{RM}$  | Maximum Reverse Leakage Current         | $V_R = 600\text{V}$  | $T_j = 25^\circ\text{C}$  |     |     | 25   | $\mu\text{A}$ |
|           |   |  | $T_j = 125^\circ\text{C}$ |     |     | 500  |               |
| $I_F$     | DC Forward Current                      |  |                           | 30  |     | A    |               |
| $V_F$     | Diode Forward Voltage                   | $I_F = 30\text{A}$   |                           | 1.8 | 2.2 | V    |               |
|           |   | $I_F = 60\text{A}$   |                           | 2.2 |     |      |               |
|           |   | $I_F = 30\text{A}$   | $T_j = 125^\circ\text{C}$ | 1.5 |     |      |               |
| $t_{rr}$  | Reverse Recovery Time                   | $I_F = 30\text{A}$<br>$V_R = 400\text{V}$<br>$di/dt = 200\text{A}/\mu\text{s}$ | $T_j = 25^\circ\text{C}$  | 25  |     | ns   |               |
|           |   |  | $T_j = 125^\circ\text{C}$ | 160 |     |      |               |
| $Q_{rr}$  | Reverse Recovery Charge                 | $I_F = 30\text{A}$<br>$V_R = 400\text{V}$<br>$di/dt = 200\text{A}/\mu\text{s}$ | $T_j = 25^\circ\text{C}$  | 35  |     | nC   |               |
|           |   |  | $T_j = 125^\circ\text{C}$ | 480 |     |      |               |

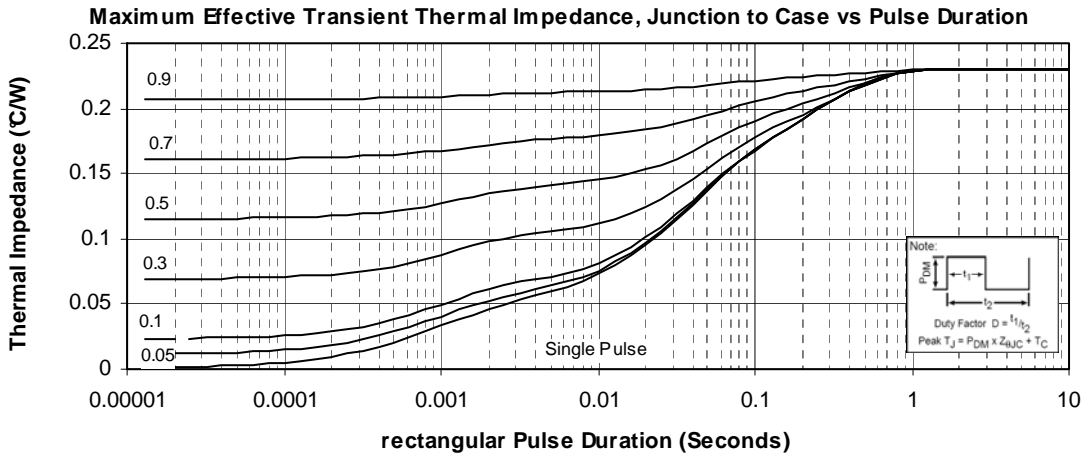
**Thermal and package characteristics**

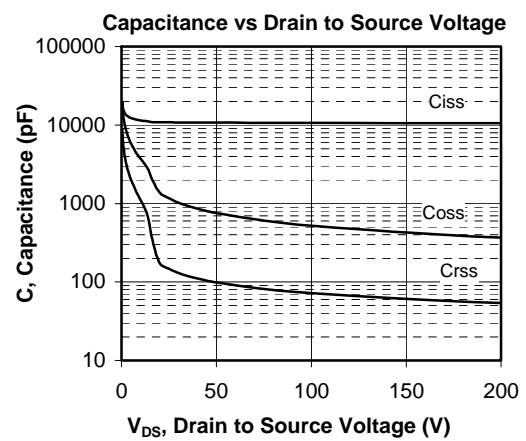
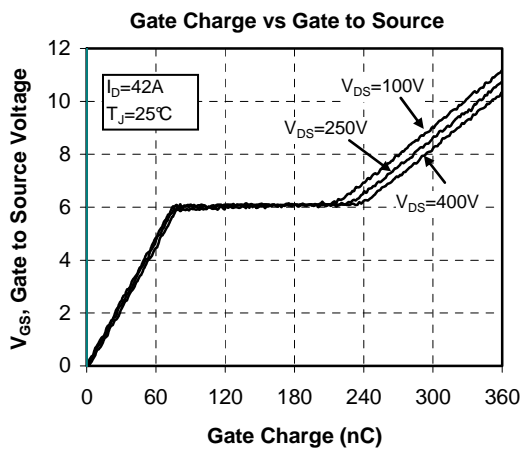
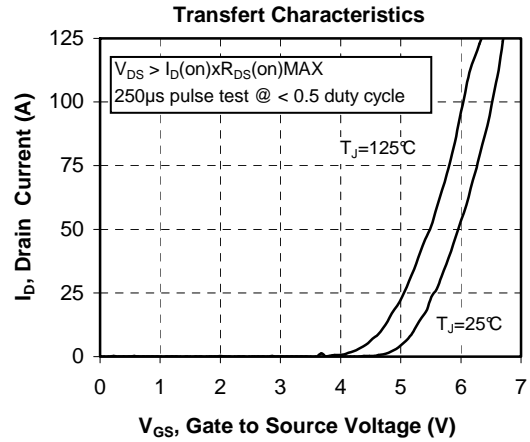
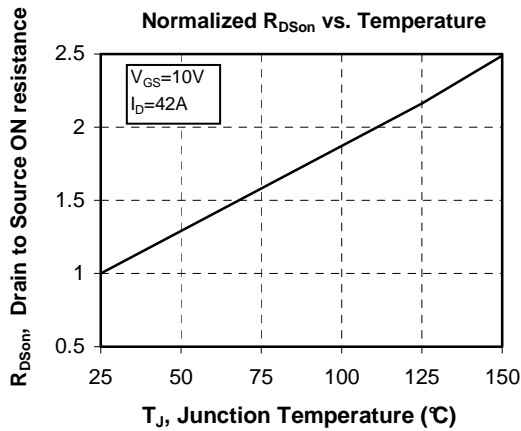
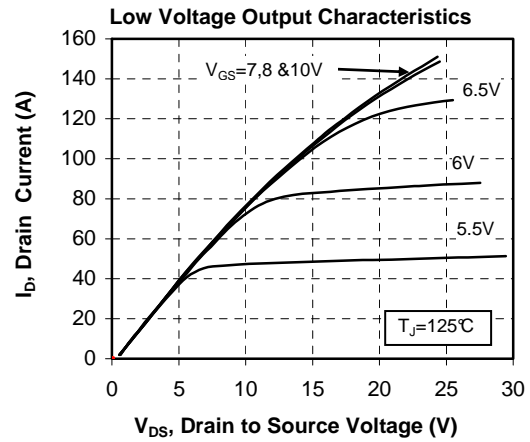
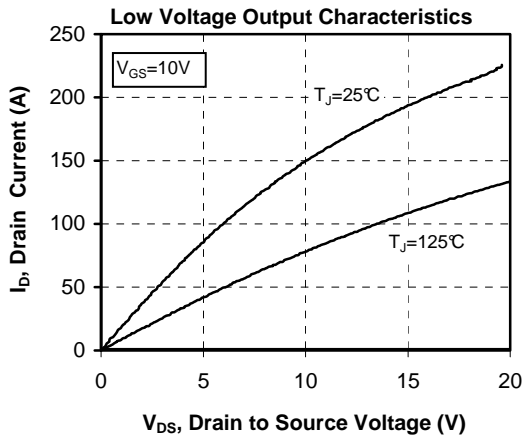
| Symbol         | Characteristic  | Min    | Typ  | Max  | Unit                      |
|----------------|---|--------|------|------|---------------------------|
| $R_{thJC}$     | Junction to Case Thermal Resistance   | Mosfet |      | 0.23 | $^\circ\text{C}/\text{W}$ |
|                |   | Diode  |      | 1.05 |                           |
| $R_{thJA}$     | Junction to Ambient (IGBT & Diode)  |        |      | 20   | $^\circ\text{C}/\text{W}$ |
| $V_{ISOL}$     | RMS Isolation Voltage, any terminal to case $t = 1\text{ min}, I_{isol} < 1\text{mA}, 50/60\text{Hz}$ | 2500   |      |      | V                         |
| $T_J, T_{STG}$ | Storage Temperature Range   | -40    |      | 150  | $^\circ\text{C}$          |
| $T_L$          | Max Lead Temp for Soldering: 0.063" from case for 10 sec  |        |      | 300  | $^\circ\text{C}$          |
| Torque         | Mounting torque (Mounting = 8-32 or 4mm Machine and terminals = 4mm Machine)                          |        |      | 1.5  | N.m                       |
| Wt             | Package Weight  |        | 29.2 |      | g                         |

## SOT-227 (ISOTOP<sup>®</sup>) Package Outline

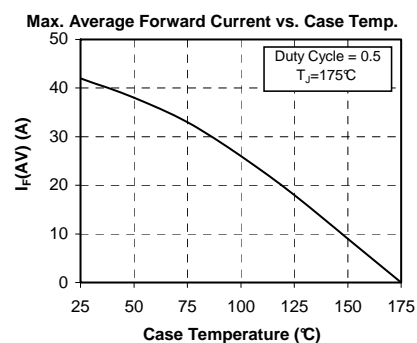
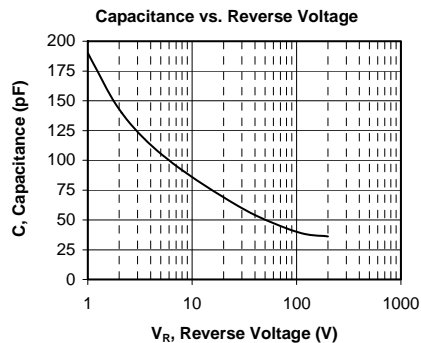
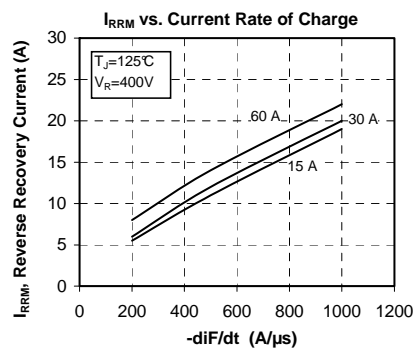
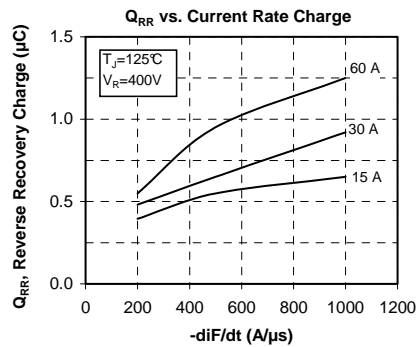
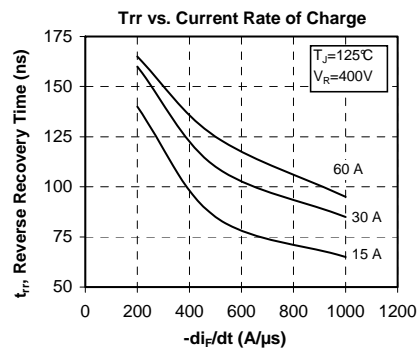
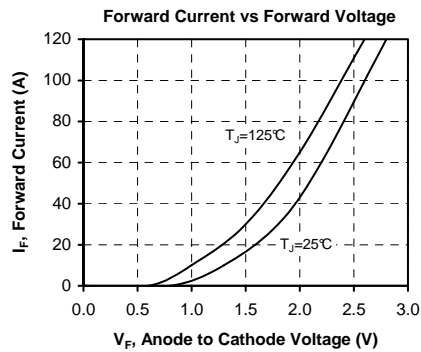
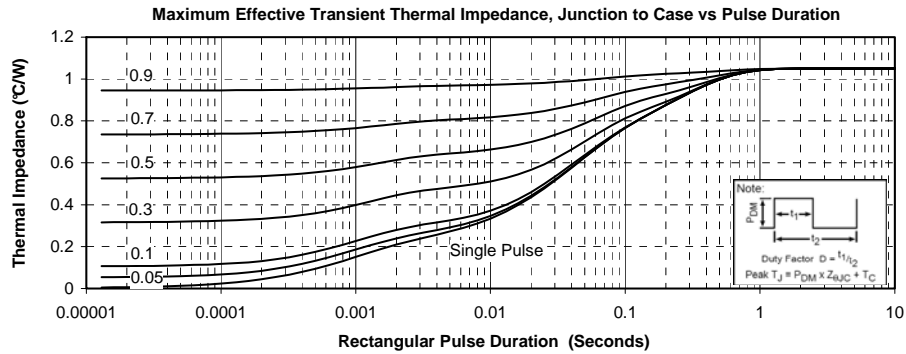


## Typical Mosfet Performance Curve





## Typical Diode Performance Curve



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