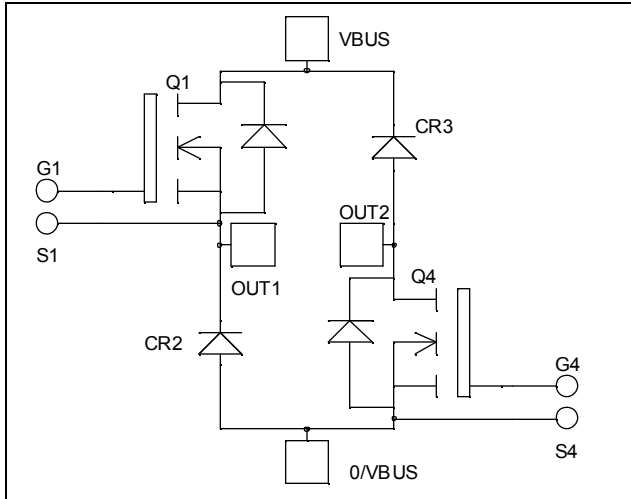


## Asymmetrical - bridge MOSFET Power Module

$V_{DSS} = 200V$   
 $R_{DSon} = 8m\Omega$  typ @  $T_j = 25^\circ C$   
 $I_D = 208A$  @  $T_c = 25^\circ C$



### Application

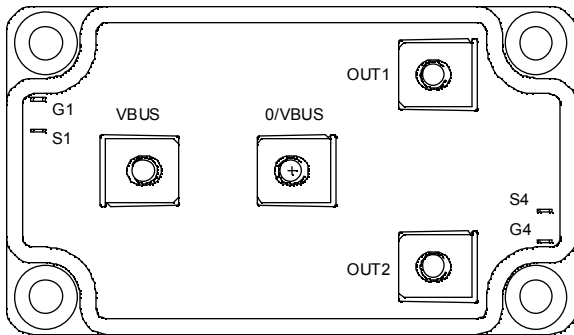
- Welding converters
- Switched Mode Power Supplies
- Switched Reluctance Motor Drives

### Features

- Power MOS 7<sup>®</sup> MOSFETs
  - Low  $R_{DSon}$
  - Low input and Miller capacitance
  - Low gate charge
  - Avalanche energy rated
  - Very rugged
- Kelvin source for easy drive
- Very low stray inductance
  - Symmetrical design
  - M5 power connectors
- High level of integration


### Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Low profile
- RoHS Compliant



### Absolute maximum ratings

| Symbol     | Parameter   | Max ratings        | Unit      |
|------------|---|--------------------|-----------|
| $V_{DSS}$  | Drain - Source Breakdown Voltage                  | 200                | V         |
| $I_D$      | Continuous Drain Current                          | $T_c = 25^\circ C$ | 208       |
|            |   | $T_c = 80^\circ C$ | 155       |
| $I_{DM}$   | Pulsed Drain current                              | 832                |           |
| $V_{GS}$   | Gate - Source Voltage                             | $\pm 30$           | V         |
| $R_{DSon}$ | Drain - Source ON Resistance                      | 10                 | $m\Omega$ |
| $P_D$      | Maximum Power Dissipation                         | $T_c = 25^\circ C$ | 781       |
| $I_{AR}$   | Avalanche current (repetitive and non repetitive) | 100                | A         |
| $E_{AR}$   | Repetitive Avalanche Energy                       | 50                 | mJ        |
| $E_{AS}$   | Single Pulse Avalanche Energy                     | 3000               |           |


**CAUTION:** These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on [www.microsemi.com](http://www.microsemi.com)

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 | $V_{GS} = 0\text{V}, V_{DS} = 200\text{V}$    |     |     | 375       | $\mu\text{A}$    |
|              |                                 | $V_{GS} = 0\text{V}, V_{DS} = 160\text{V}$    |     |     | 1500      |                  |
| $R_{DS(on)}$ | Drain – Source on Resistance    | $V_{GS} = 10\text{V}, I_D = 104\text{A}$      |     | 8   | 10        | $\text{m}\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage          | $V_{GS} = V_{DS}, I_D = 5\text{mA}$           | 3   |     | 5         | V                |
| $I_{GSS}$    | Gate – Source Leakage Current   | $V_{GS} = \pm 30\text{V}, V_{DS} = 0\text{V}$ |     |     | $\pm 150$ | nA               |

**Dynamic Characteristics**

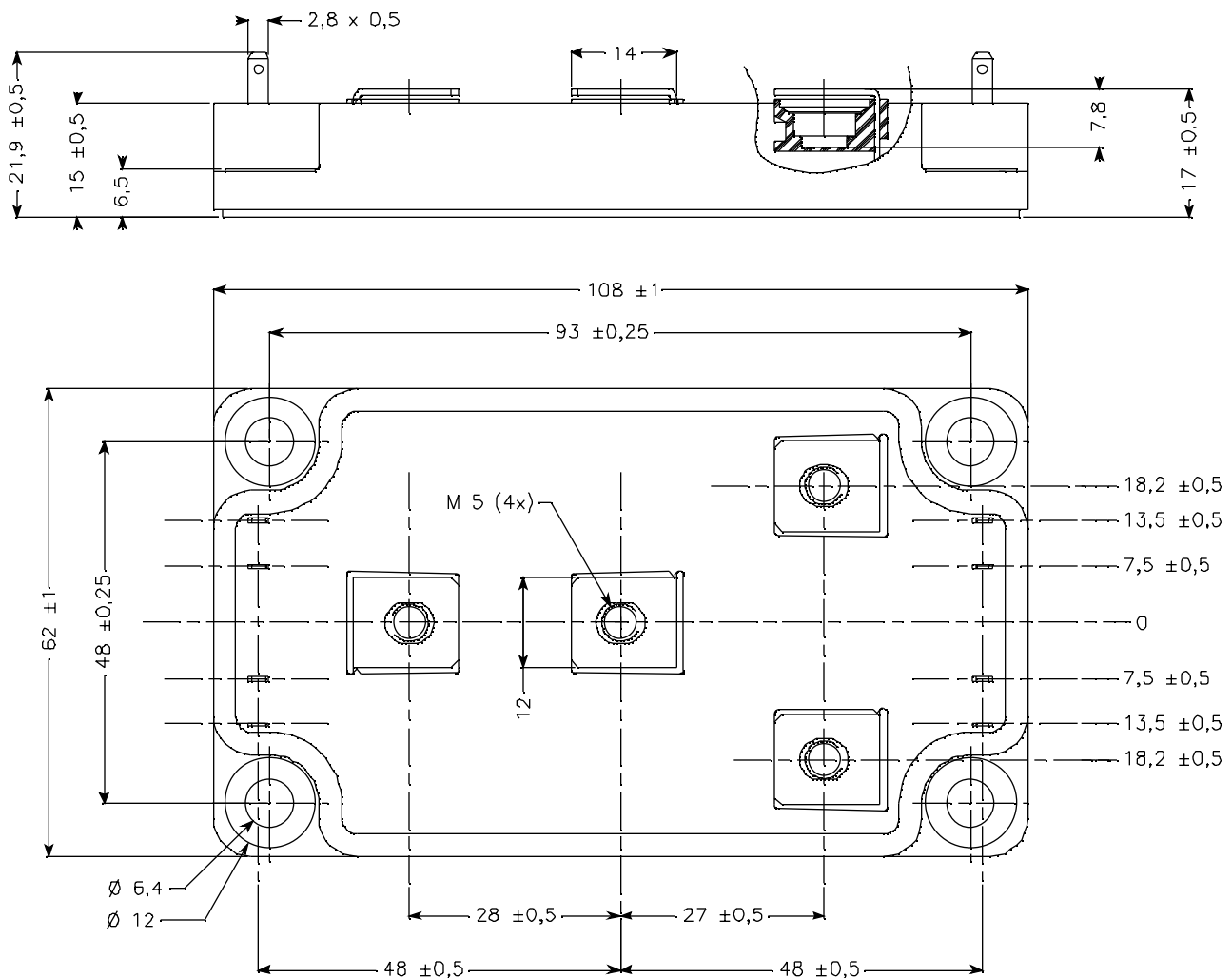
| Symbol       | Characteristic               | Test Conditions   | Min | Typ  | Max | Unit          |
|--------------|------------------------------|---|-----|------|-----|---------------|
| $C_{iss}$    | Input Capacitance            | $V_{GS} = 0\text{V}$  |     | 14.4 |     | nF            |
| $C_{oss}$    | Output Capacitance           | $V_{DS} = 25\text{V}$   |     | 4.66 |     |               |
| $C_{rss}$    | Reverse Transfer Capacitance | $f = 1\text{MHz}$   |     | 0.29 |     |               |
| $Q_g$        | Total gate Charge            | $V_{GS} = 10\text{V}$   |     | 280  |     | nC            |
| $Q_{gs}$     | Gate – Source Charge         | $V_{Bus} = 100\text{V}$   |     | 106  |     |               |
| $Q_{gd}$     | Gate – Drain Charge          | $I_D = 208\text{A}$   |     | 134  |     |               |
| $T_{d(on)}$  | Turn-on Delay Time           | <b>Inductive switching @ <math>125^\circ\text{C}</math></b><br>$V_{GS} = 15\text{V}$<br>$V_{Bus} = 133\text{V}$<br>$I_D = 208\text{A}$<br>$R_G = 2.5\Omega$ |     | 32   |     | ns            |
| $T_r$        | Rise Time                    |   |     | 64   |     |               |
| $T_{d(off)}$ | Turn-off Delay Time          |   |     | 88   |     |               |
| $T_f$        | Fall Time                    |   |     | 116  |     |               |
| $E_{on}$     | Turn-on Switching Energy     | <b>Inductive switching @ <math>25^\circ\text{C}</math></b><br>$V_{GS} = 15\text{V}, V_{Bus} = 133\text{V}$<br>$I_D = 208\text{A}, R_G = 2.5\Omega$          |     | 1698 |     | $\mu\text{J}$ |
| $E_{off}$    | Turn-off Switching Energy    |   |     | 1858 |     |               |
| $E_{on}$     | Turn-on Switching Energy     | <b>Inductive switching @ <math>125^\circ\text{C}</math></b><br>$V_{GS} = 15\text{V}, V_{Bus} = 133\text{V}$<br>$I_D = 208\text{A}, R_G = 2.5\Omega$         |     | 1872 |     | $\mu\text{J}$ |
| $E_{off}$    | Turn-off Switching Energy    |   |     | 1972 |     |               |

**Diode ratings and characteristics**

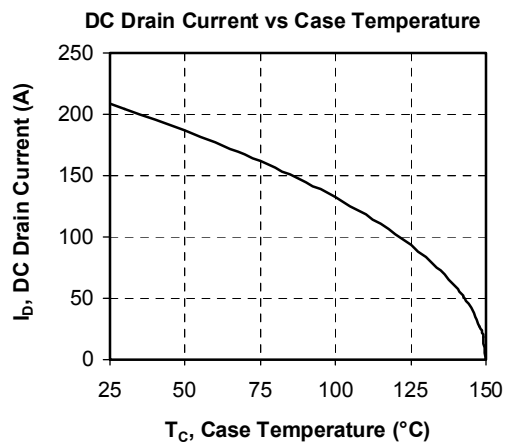
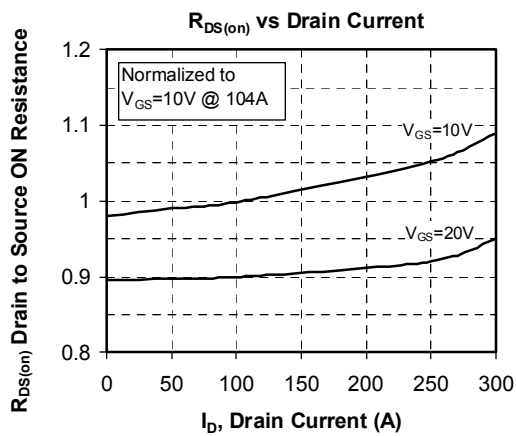
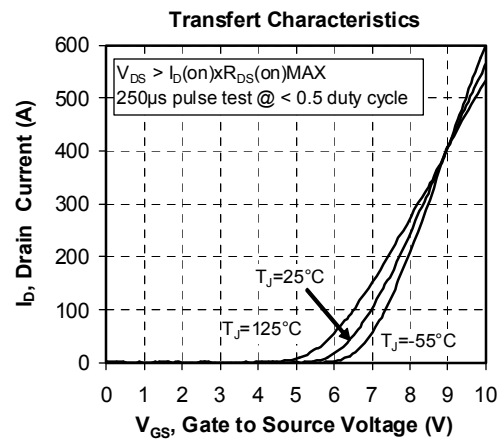
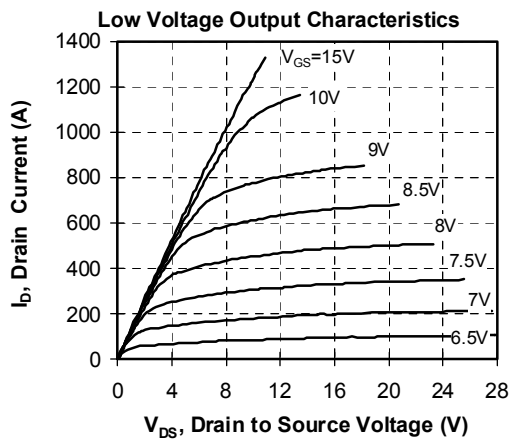
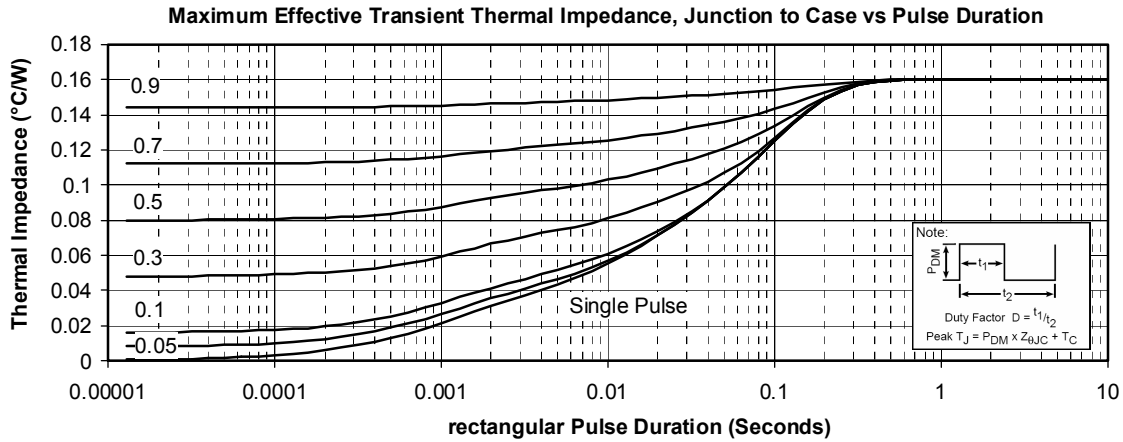
| Symbol    | Characteristic                          | Test Conditions                            | Min                       | Typ  | Max | Unit          |
|-----------|---|--|---------------------------|------|-----|---------------|
| $V_{RRM}$ | Maximum Peak Repetitive Reverse Voltage |  | 200                       |      |     | V             |
| $I_{RM}$  | Maximum Reverse Leakage Current         | $V_R = 200\text{V}$                        | $T_j = 25^\circ\text{C}$  |      | 250 | $\mu\text{A}$ |
|           |   |  | $T_j = 125^\circ\text{C}$ |      | 600 |               |
| $I_F$     | DC Forward Current                      |  |                           | 200  |     | A             |
| $V_F$     | Diode Forward Voltage                   | $I_F = 200\text{A}$                        |                           | 1    | 1.1 | V             |
|           |   | $I_F = 400\text{A}$                        |                           | 1.4  |     |               |
|           |   | $I_F = 200\text{A}$                        | $T_j = 125^\circ\text{C}$ | 0.9  |     |               |
| $t_{rr}$  | Reverse Recovery Time                   | $I_F = 200\text{A}$<br>$V_R = 133\text{V}$ | $T_j = 25^\circ\text{C}$  | 60   |     | ns            |
|           |   |  | $T_j = 125^\circ\text{C}$ | 110  |     |               |
| $Q_{rr}$  | Reverse Recovery Charge                 | $di/dt = 400\text{A}/\mu\text{s}$          | $T_j = 25^\circ\text{C}$  | 400  |     | nC            |
|           |   |  | $T_j = 125^\circ\text{C}$ | 1680 |     |               |

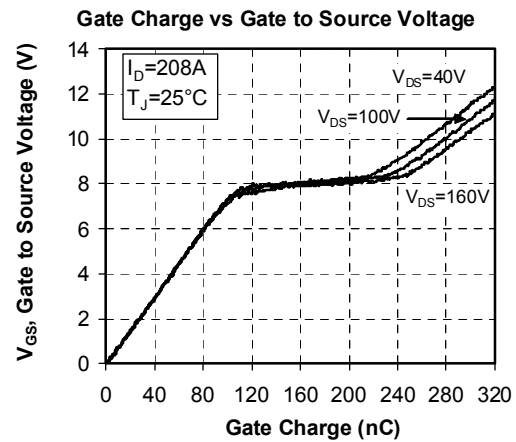
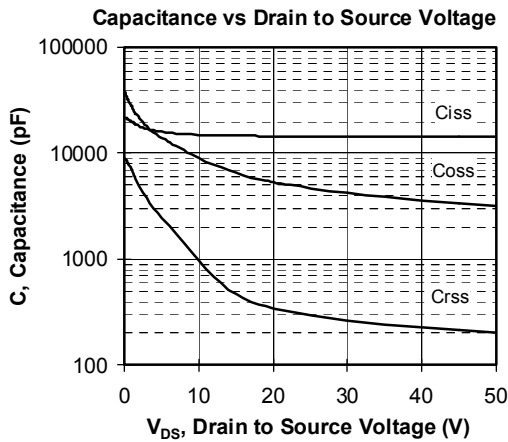
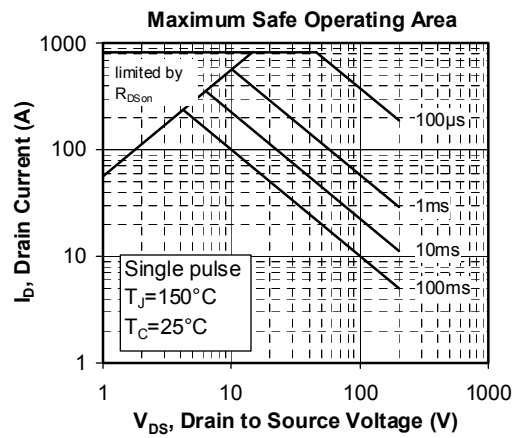
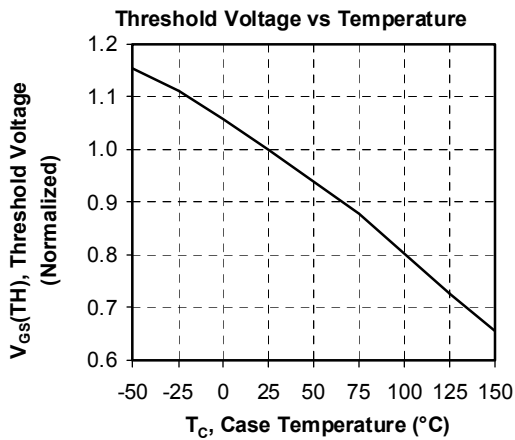
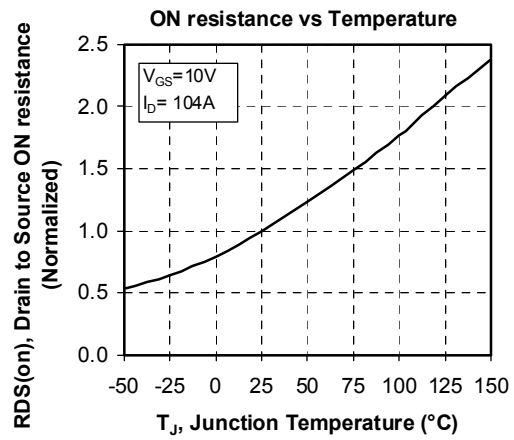
**Thermal and package characteristics**
*Symbol Characteristic*
*Min Typ Max Unit*

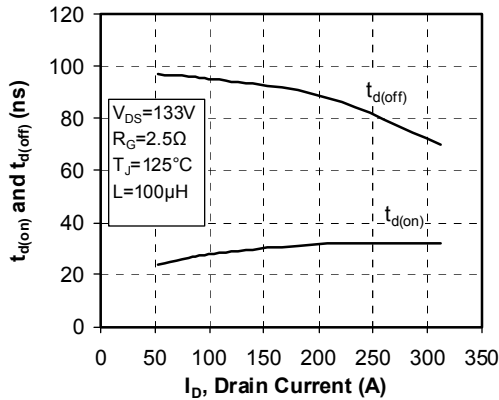
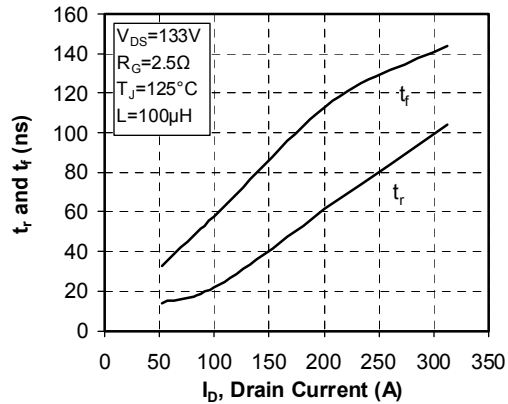
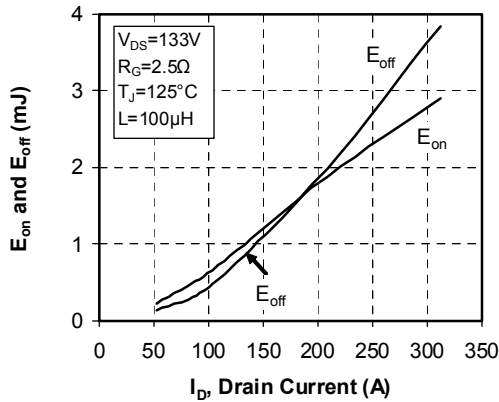
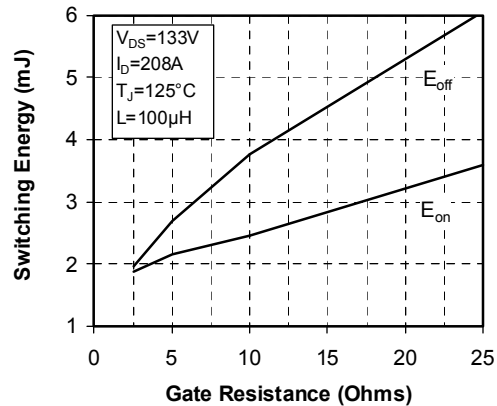
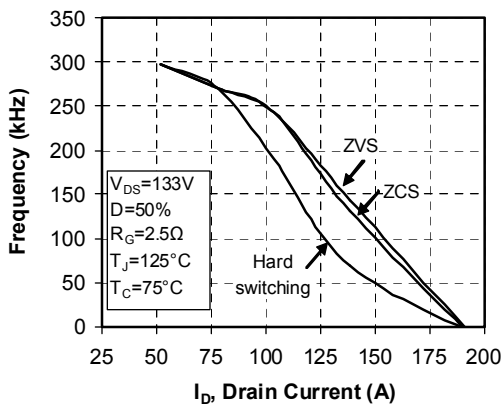
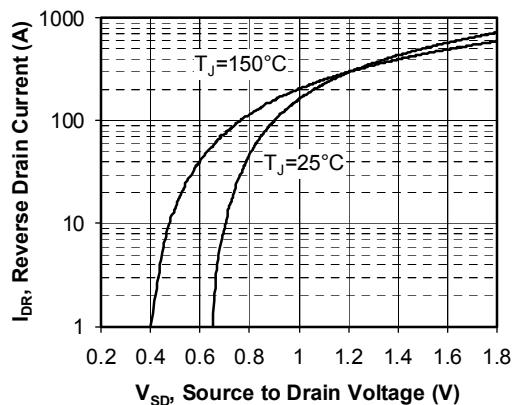
| <i>Symbol</i>     | <i>Characteristic</i>   |               | <i>Min</i> | <i>Typ</i> | <i>Max</i> | <i>Unit</i> |
|-------------------|---|---------------|------------|------------|------------|-------------|
| R <sub>thJC</sub> | Junction to Case Thermal Resistance   | Transistor    |            |            | 0.16       | °C/W        |
|                   |   | Diode         |            |            | 0.29       |             |
| V <sub>ISOL</sub> | RMS Isolation Voltage, any terminal to case t = 1 min, I <sub>isol</sub> < 1mA, 50/60Hz |               | 2500       |            |            | V           |
| T <sub>J</sub>    | Operating junction temperature range  |               | -40        |            | 150        | °C          |
| T <sub>STG</sub>  | Storage Temperature Range   |               | -40        |            | 125        |             |
| T <sub>C</sub>    | Operating Case Temperature  |               | -40        |            | 100        |             |
| Torque            | Mounting torque   | To heatsink   | M6         | 3          | 5          | N.m         |
|                   |   | For terminals | M5         | 2          | 3.5        |             |
| Wt                | Package Weight  |               |            |            | 280        | g           |

**SP6 Package outline (dimensions in mm)**

 See application note APT0601 - Mounting Instructions for SP6 Power Modules on [www.microsemi.com](http://www.microsemi.com)

## Typical Performance Curve





**Delay Times vs Current**

**Rise and Fall times vs Current**

**Switching Energy vs Current**

**Switching Energy vs Gate Resistance**

**Operating Frequency vs Drain Current**

**Source to Drain Diode Forward Voltage**


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