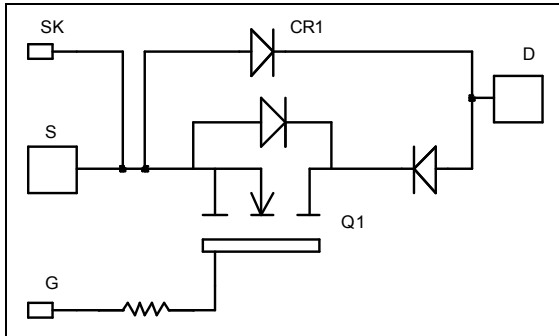


**Single switch  
Series & parallel diodes  
MOSFET Power Module**

**$V_{DSS} = 1000V$   
 $R_{DSon} = 65m\Omega$  typ @  $T_j = 25^\circ C$   
 $I_D = 145A$  @  $T_c = 25^\circ C$**



### Application

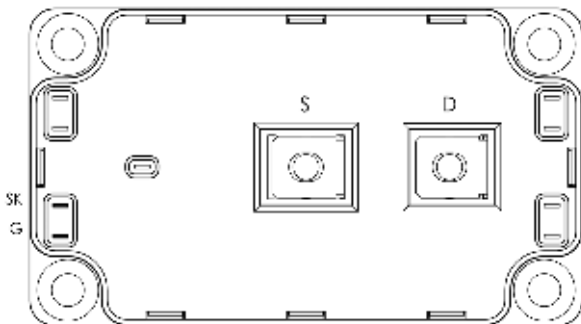
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

### 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
- AlN substrate for improved thermal performance

### Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Low profile
- 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                  | 1000               | V          |
| $I_D$      | Continuous Drain Current                          | $T_c = 25^\circ C$ | A          |
|            |                                                   | $T_c = 80^\circ C$ |            |
| $I_{DM}$   | Pulsed Drain current                              | 580                |            |
| $V_{GS}$   | Gate - Source Voltage                             | $\pm 30$           | V          |
| $R_{DSon}$ | Drain - Source ON Resistance                      | 78                 | m $\Omega$ |
| $P_D$      | Maximum Power Dissipation                         | $T_c = 25^\circ C$ | W          |
| $I_{AR}$   | Avalanche current (repetitive and non repetitive) | 30                 | A          |
| $E_{AR}$   | Repetitive Avalanche Energy                       | 50                 | mJ         |
| $E_{AS}$   | Single Pulse Avalanche Energy                     | 3200               |            |

**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)

**Electrical Characteristics**

| Symbol       | Characteristic                  | Test Conditions                 | Min | Typ | Max       | Unit       |
|--------------|---------------------------------|---------------------------------|-----|-----|-----------|------------|
| $I_{DSS}$    | Zero Gate Voltage Drain Current | $V_{GS} = 0V, V_{DS} = 1000V$   |     |     | 400       | $\mu A$    |
| $R_{DS(on)}$ | Drain – Source on Resistance    | $V_{GS} = 10V, I_D = 72.5A$     |     | 65  | 78        | m $\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage          | $V_{GS} = V_{DS}, I_D = 20mA$   | 3   |     | 5         | V          |
| $I_{GSS}$    | Gate – Source Leakage Current   | $V_{GS} = \pm 30V, V_{DS} = 0V$ |     |     | $\pm 400$ | nA         |

**Dynamic Characteristics**

| Symbol       | Characteristic                      | Test Conditions                                                                                        | Min | Typ  | Max   | Unit |
|--------------|-------------------------------------|--------------------------------------------------------------------------------------------------------|-----|------|-------|------|
| $C_{iss}$    | Input Capacitance                   | $V_{GS} = 0V$                                                                                          |     | 28.5 |       | nF   |
| $C_{oss}$    | Output Capacitance                  | $V_{DS} = 25V$                                                                                         |     | 5.08 |       |      |
| $C_{rss}$    | Reverse Transfer Capacitance        | $f = 1MHz$                                                                                             |     | 0.9  |       |      |
| $Q_g$        | Total gate Charge                   | $V_{GS} = 10V$                                                                                         |     | 1068 |       | nC   |
| $Q_{gs}$     | Gate – Source Charge                | $V_{Bus} = 500V$                                                                                       |     | 136  |       |      |
| $Q_{gd}$     | Gate – Drain Charge                 | $I_D = 145A$                                                                                           |     | 692  |       |      |
| $T_{d(on)}$  | Turn-on Delay Time                  | $V_{GS} = 15V$                                                                                         |     | 18   |       | ns   |
| $T_r$        | Rise Time                           | $V_{Bus} = 500V$                                                                                       |     | 14   |       |      |
| $T_{d(off)}$ | Turn-off Delay Time                 | $I_D = 145A$                                                                                           |     | 140  |       |      |
| $T_f$        | Fall Time                           | $R_G = 0.75\Omega$                                                                                     |     | 55   |       |      |
| $E_{on}$     | Turn-on Switching Energy            | <b>Inductive switching @ 25°C</b><br>$V_{GS} = 15V, V_{Bus} = 670V$<br>$I_D = 145A, R_G = 0.75\Omega$  |     | 4.8  |       | mJ   |
| $E_{off}$    | Turn-off Switching Energy           |                                                                                                        |     | 2.9  |       |      |
| $E_{on}$     | Turn-on Switching Energy            | <b>Inductive switching @ 125°C</b><br>$V_{GS} = 15V, V_{Bus} = 670V$<br>$I_D = 145A, R_G = 0.75\Omega$ |     | 8    |       | mJ   |
| $E_{off}$    | Turn-off Switching Energy           |                                                                                                        |     | 3.9  |       |      |
| $R_{thJC}$   | Junction to Case Thermal Resistance |                                                                                                        |     |      | 0.038 | °C/W |

**Series diode ratings and characteristics**

| Symbol     | Characteristic                          | Test Conditions                                      | Min                 | Typ  | Max  | Unit    |
|------------|-----------------------------------------|------------------------------------------------------|---------------------|------|------|---------|
| $V_{RRM}$  | Maximum Peak Repetitive Reverse Voltage |                                                      | 1000                |      |      | V       |
| $I_{RM}$   | Maximum Reverse Leakage Current         | $V_R = 1000V$                                        |                     |      | 750  | $\mu A$ |
| $I_F$      | DC Forward Current                      | $T_c = 80^\circ C$                                   |                     | 240  |      | A       |
| $V_F$      | Diode Forward Voltage                   | $I_F = 240A$                                         |                     | 2    | 2.5  | V       |
|            |                                         | $I_F = 480A$                                         |                     | 2.2  |      |         |
|            |                                         | $I_F = 240A, T_j = 125^\circ C$                      |                     | 1.7  |      |         |
| $t_{rr}$   | Reverse Recovery Time                   | $I_F = 240A$<br>$V_R = 667V$<br>$di/dt = 800A/\mu s$ | $T_j = 25^\circ C$  | 280  |      | ns      |
|            |                                         |                                                      | $T_j = 125^\circ C$ | 350  |      |         |
| $Q_{rr}$   | Reverse Recovery Charge                 | $T_j = 25^\circ C$                                   |                     | 3.04 |      | $\mu C$ |
|            |                                         |                                                      | $T_j = 125^\circ C$ | 14.4 |      |         |
| $R_{thJC}$ | Junction to Case Thermal Resistance     |                                                      |                     |      | 0.23 | °C/W    |

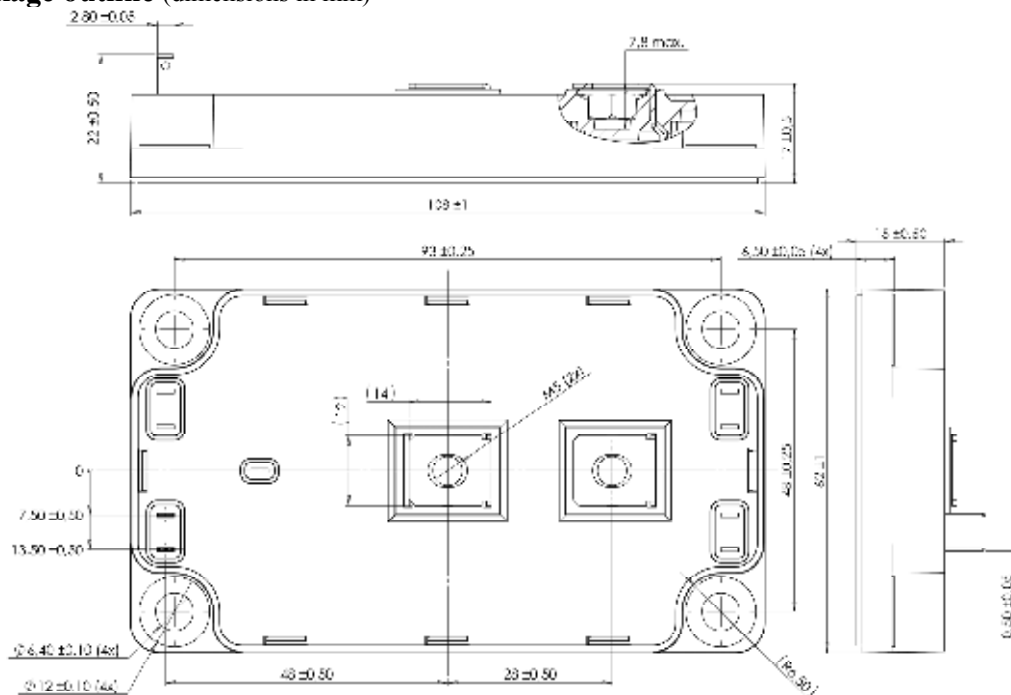
## Parallel diode ratings and characteristics

| Symbol     | Characteristic                          | Test Conditions                                      |                     | Min  | Typ  | Max  | Unit         |
|------------|-----------------------------------------|------------------------------------------------------|---------------------|------|------|------|--------------|
| $V_{RRM}$  | Maximum Peak Repetitive Reverse Voltage |                                                      |                     | 1000 |      |      | V            |
| $I_{RM}$   | Maximum Reverse Leakage Current         | $V_R = 1000V$                                        |                     |      |      | 750  | $\mu A$      |
| $I_F$      | DC Forward Current                      |                                                      | $T_c = 80^\circ C$  |      | 240  |      | A            |
| $V_F$      | Diode Forward Voltage                   | $I_F = 240A$                                         |                     |      | 2    | 2.5  | V            |
|            |                                         | $I_F = 480A$                                         |                     |      | 2.2  |      |              |
|            |                                         | $I_F = 240A$                                         | $T_j = 125^\circ C$ |      | 1.7  |      |              |
| $t_{rr}$   | Reverse Recovery Time                   | $I_F = 240A$<br>$V_R = 667V$<br>$di/dt = 800A/\mu s$ | $T_j = 25^\circ C$  |      | 280  |      | ns           |
|            |                                         |                                                      | $T_j = 125^\circ C$ |      | 350  |      |              |
| $Q_{rr}$   | Reverse Recovery Charge                 |                                                      | $T_j = 25^\circ C$  |      | 3.04 |      | $\mu C$      |
|            |                                         |                                                      | $T_j = 125^\circ C$ |      | 14.4 |      |              |
| $R_{thJC}$ | Junction to Case Thermal Resistance     |                                                      |                     |      |      | 0.23 | $^\circ C/W$ |

## Thermal and package characteristics

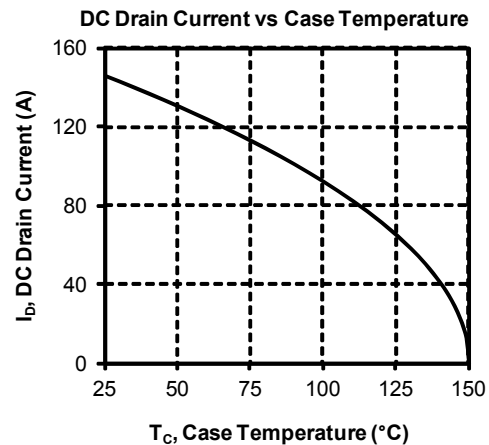
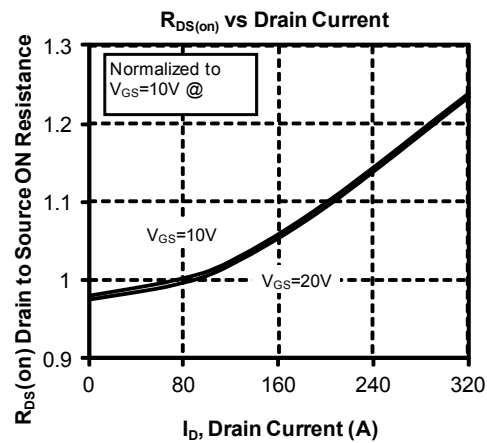
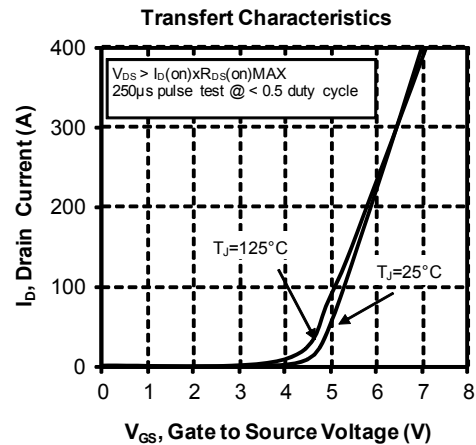
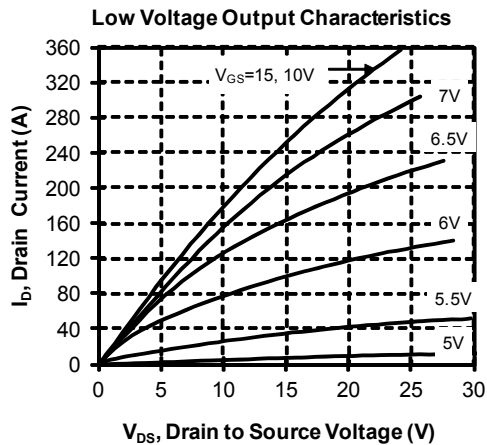
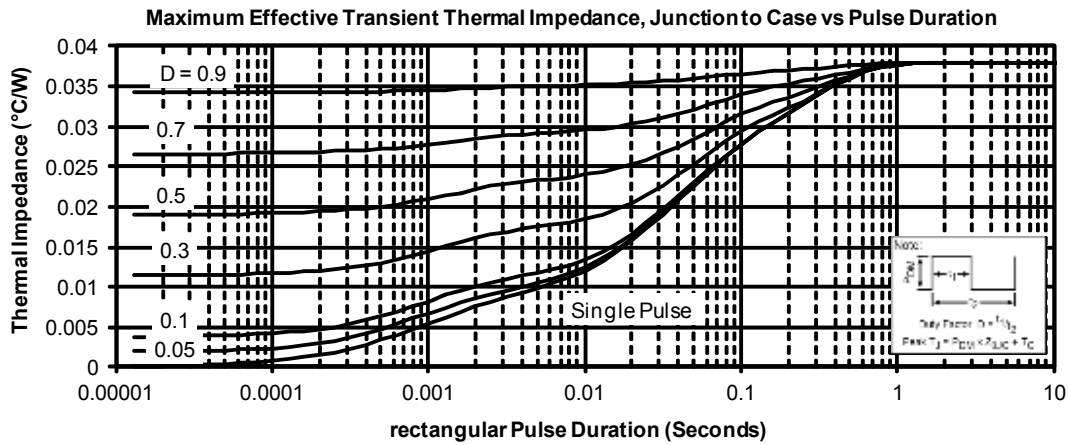
| Symbol     | Characteristic                                                   |               |    | Min  | Max             | Unit       |
|------------|------------------------------------------------------------------|---------------|----|------|-----------------|------------|
| $V_{ISOL}$ | RMS Isolation Voltage, any terminal to case $t = 1$ min, 50/60Hz |               |    | 4000 |                 | V          |
| $T_J$      | Operating junction temperature range                             |               |    | -40  | 150             | $^\circ C$ |
| $T_{JOP}$  | Recommended junction temperature under switching conditions      |               |    | -40  | $T_{jmax} - 25$ |            |
| $T_{STG}$  | Storage Temperature Range                                        |               |    | -40  | 125             |            |
| $T_C$      | Operating Case Temperature                                       |               |    | -40  | 100             |            |
| Torque     | Mounting torque                                                  | To Heatsink   | M6 | 3    | 5               | N.m        |
|            |                                                                  | For terminals | M5 | 2    | 3.5             |            |
| Wt         | Package Weight                                                   |               |    |      | 300             | g          |

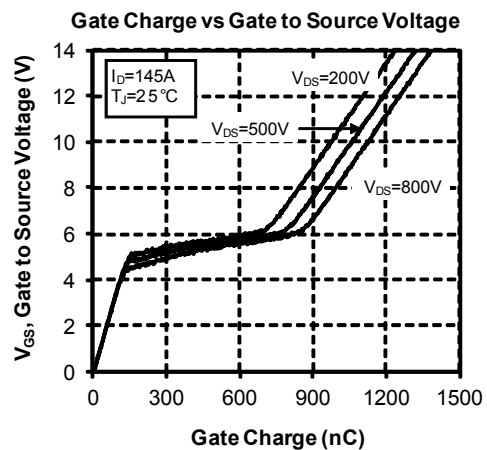
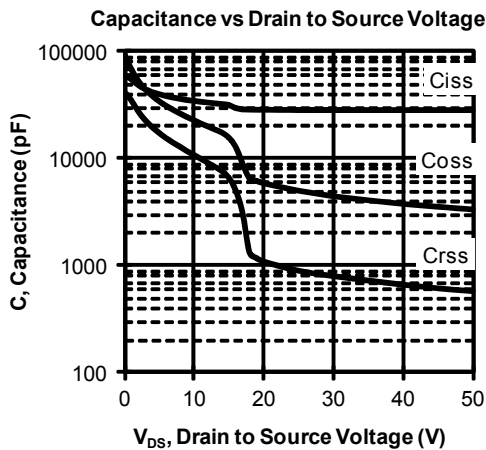
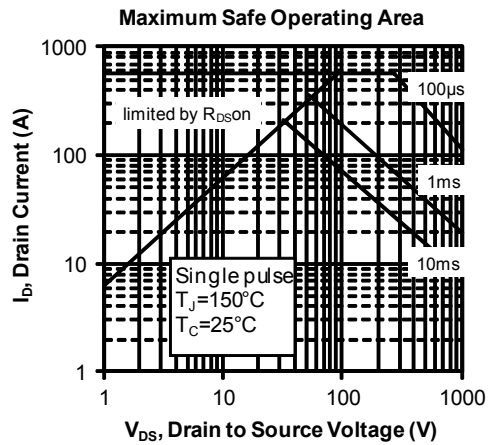
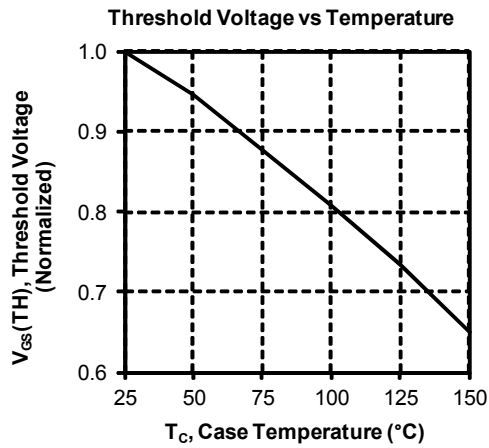
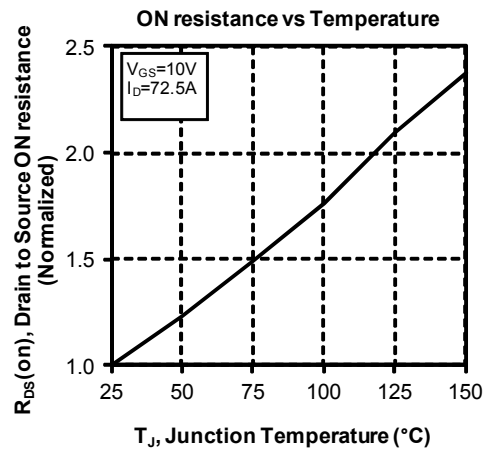
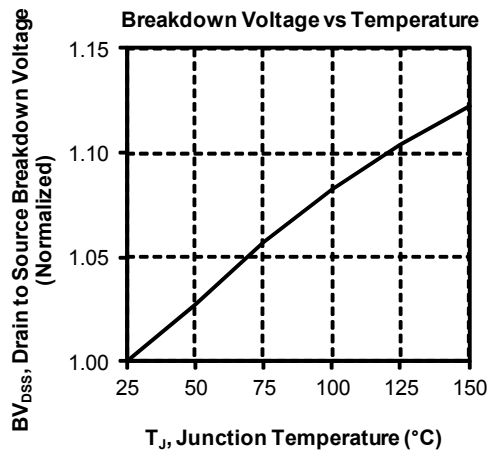
## SP6 Package outline (dimensions in mm)

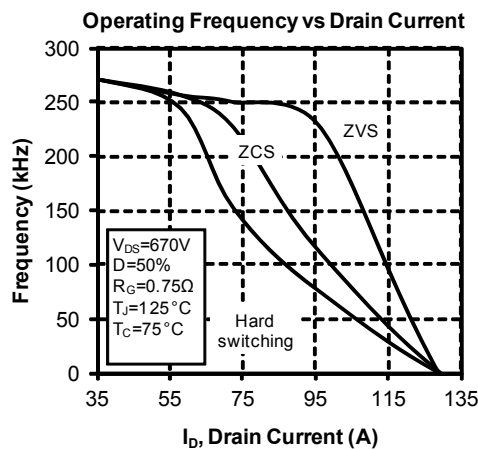
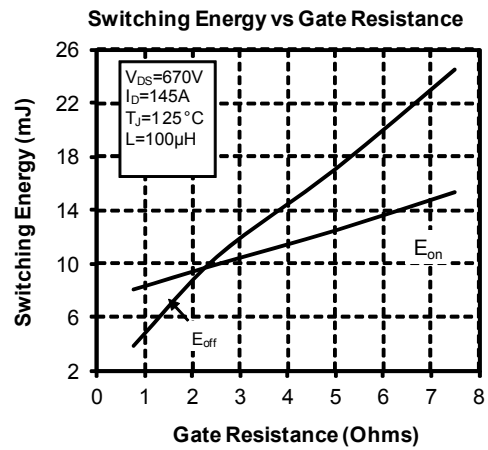
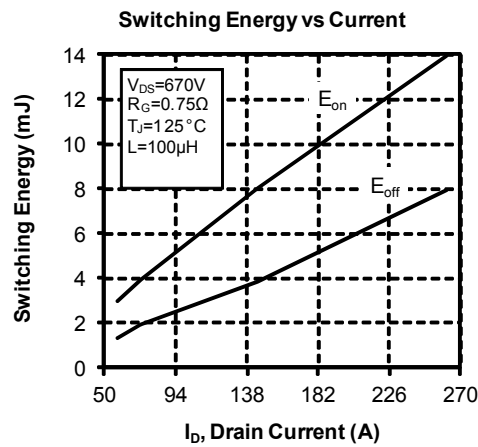
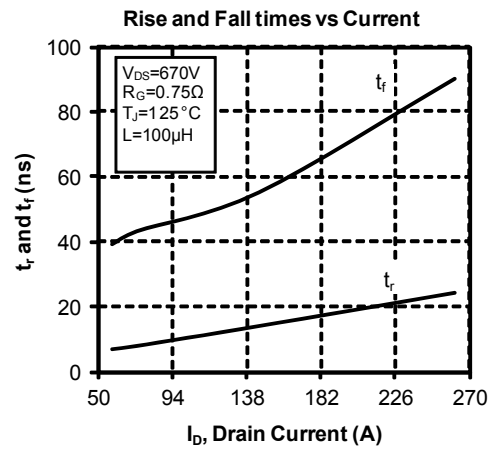
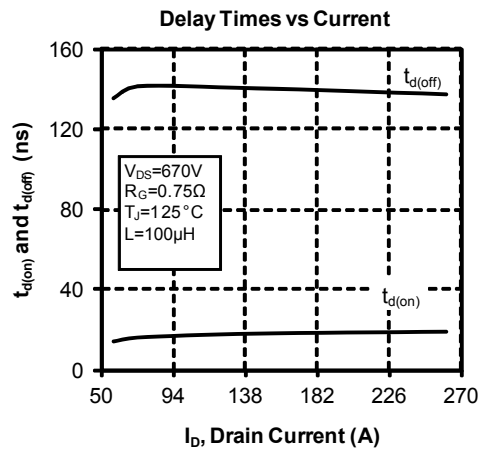


See application note APT0601 - Mounting Instructions for SP6 Power Modules on [www.microsemi.com](http://www.microsemi.com)

## Typical Performance Curve







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