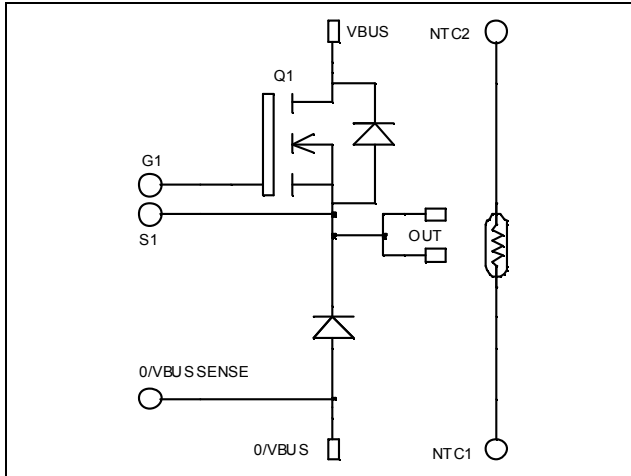


## *Buck chopper MOSFET Power Module*

**$V_{DSS} = 1200V$**

**$R_{DSon} = 290m\Omega$  typ @  $T_j = 25^\circ C$**

**$I_D = 34A$  @  $T_c = 25^\circ C$**



### Application

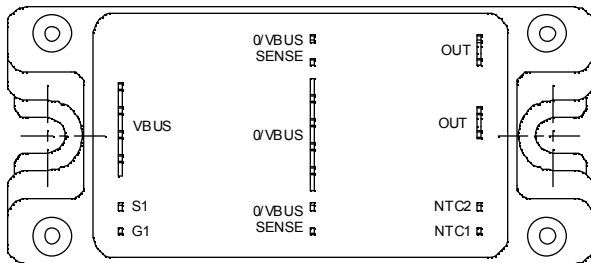
- AC and DC motor control
- Switched Mode Power Supplies

### 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
  - Lead frames for power connections
- Internal thermistor for temperature monitoring
- High level of integration

### Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Solderable terminals both for power and signal for easy PCB mounting
- Low profile
- RoHS Compliant



### Absolute maximum ratings

| Symbol     | Parameter                                         | Max ratings               | Unit      |
|------------|---------------------------------------------------|---------------------------|-----------|
| $V_{DSS}$  | Drain - Source Breakdown Voltage                  | 1200                      | V         |
| $I_D$      | Continuous Drain Current                          | $T_c = 25^\circ C$<br>34  | A         |
|            |                                                   | $T_c = 80^\circ C$<br>25  |           |
| $I_{DM}$   | Pulsed Drain current                              | 136                       |           |
| $V_{GS}$   | Gate - Source Voltage                             | $\pm 30$                  | V         |
| $R_{DSon}$ | Drain - Source ON Resistance                      | 348                       | $m\Omega$ |
| $P_D$      | Maximum Power Dissipation                         | $T_c = 25^\circ C$<br>780 | W         |
| $I_{AR}$   | Avalanche current (repetitive and non repetitive) | 22                        | 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 | $V_{GS} = 0V, V_{DS} = 1200V$   |     |     | 350       | $\mu A$   |
|              |                                 | $V_{GS} = 0V, V_{DS} = 1000V$   |     |     | 1500      |           |
| $R_{DS(on)}$ | Drain – Source on Resistance    | $V_{GS} = 10V, I_D = 17A$       |     | 290 | 348       | $m\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage          | $V_{GS} = V_{DS}, I_D = 5mA$    | 3   |     | 5         | V         |
| $I_{GSS}$    | Gate – Source Leakage Current   | $V_{GS} = \pm 30V, V_{DS} = 0V$ |     |     | $\pm 150$ | nA        |

**Dynamic Characteristics**

| Symbol       | Characteristic               | Test Conditions                                                                                                                       | Min | Typ  | Max | Unit    |
|--------------|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-----|------|-----|---------|
| $C_{iss}$    | Input Capacitance            | $V_{GS} = 0V$                                                                                                                         |     | 10.3 |     | nF      |
| $C_{oss}$    | Output Capacitance           | $V_{DS} = 25V$                                                                                                                        |     | 1.54 |     |         |
| $C_{rss}$    | Reverse Transfer Capacitance | $f = 1MHz$                                                                                                                            |     | 0.26 |     |         |
| $Q_g$        | Total gate Charge            | $V_{GS} = 10V$                                                                                                                        |     | 374  |     | nC      |
| $Q_{gs}$     | Gate – Source Charge         | $V_{Bus} = 600V$                                                                                                                      |     | 48   |     |         |
| $Q_{gd}$     | Gate – Drain Charge          | $I_D = 34A$                                                                                                                           |     | 240  |     |         |
| $T_{d(on)}$  | Turn-on Delay Time           | <b>Inductive switching @ <math>125^\circ\text{C}</math></b><br>$V_{GS} = 15V$<br>$V_{Bus} = 800V$<br>$I_D = 34A$<br>$R_G = 2.5\Omega$ |     | 20   |     | ns      |
| $T_r$        | Rise Time                    |                                                                                                                                       |     | 15   |     |         |
| $T_{d(off)}$ | Turn-off Delay Time          |                                                                                                                                       |     | 160  |     |         |
| $T_f$        | Fall Time                    |                                                                                                                                       |     | 45   |     |         |
| $E_{on}$     | Turn-on Switching Energy     | <b>Inductive switching @ <math>25^\circ\text{C}</math></b><br>$V_{GS} = 15V, V_{Bus} = 800V$<br>$I_D = 34A, R_G = 2.5\Omega$          |     | 1980 |     | $\mu J$ |
| $E_{off}$    | Turn-off Switching Energy    |                                                                                                                                       |     | 1371 |     |         |
| $E_{on}$     | Turn-on Switching Energy     | <b>Inductive switching @ <math>125^\circ\text{C}</math></b><br>$V_{GS} = 15V, V_{Bus} = 800V$<br>$I_D = 34A, R_G = 2.5\Omega$         |     | 3131 |     | $\mu J$ |
| $E_{off}$    | Turn-off Switching Energy    |                                                                                                                                       |     | 1714 |     |         |

**Chopper diode ratings and characteristics**

| Symbol    | Characteristic                          | Test Conditions                                     | Min                       | Typ  | Max | Unit    |
|-----------|-----------------------------------------|-----------------------------------------------------|---------------------------|------|-----|---------|
| $V_{RRM}$ | Maximum Peak Repetitive Reverse Voltage |                                                     | 1200                      |      |     | V       |
| $I_{RM}$  | Maximum Reverse Leakage Current         | $V_R = 1200V$                                       | $T_j = 25^\circ\text{C}$  |      | 250 | $\mu A$ |
|           |                                         |                                                     | $T_j = 125^\circ\text{C}$ |      | 500 |         |
| $I_F$     | DC Forward Current                      | $T_c = 70^\circ\text{C}$                            |                           | 60   |     | A       |
| $V_F$     | Diode Forward Voltage                   | $I_F = 60A$                                         |                           | 2    | 2.5 | V       |
|           |                                         | $I_F = 120A$                                        |                           | 2.3  |     |         |
|           |                                         | $I_F = 60A, T_j = 125^\circ\text{C}$                |                           | 1.8  |     |         |
| $t_{rr}$  | Reverse Recovery Time                   | $I_F = 60A$<br>$V_R = 800V$<br>$di/dt = 200A/\mu s$ | $T_j = 25^\circ\text{C}$  | 400  |     | ns      |
|           |                                         |                                                     | $T_j = 125^\circ\text{C}$ | 470  |     |         |
| $Q_{rr}$  | Reverse Recovery Charge                 | $T_j = 25^\circ\text{C}$                            |                           | 1200 |     | nC      |
|           |                                         |                                                     | $T_j = 125^\circ\text{C}$ | 4000 |     |         |

## Thermal and package characteristics

| Symbol            | Characteristic                                                                       |             | Min  | Typ | Max  | Unit |
|-------------------|--------------------------------------------------------------------------------------|-------------|------|-----|------|------|
| R <sub>thJC</sub> | Junction to Case Thermal Resistance                                                  | Transistor  |      |     | 0.16 | °C/W |
|                   |                                                                                      | Diode       |      |     | 1.2  |      |
| 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 | M5   |     | 4.7  | N.m  |
| Wt                | Package Weight                                                                       |             |      |     | 160  | g    |

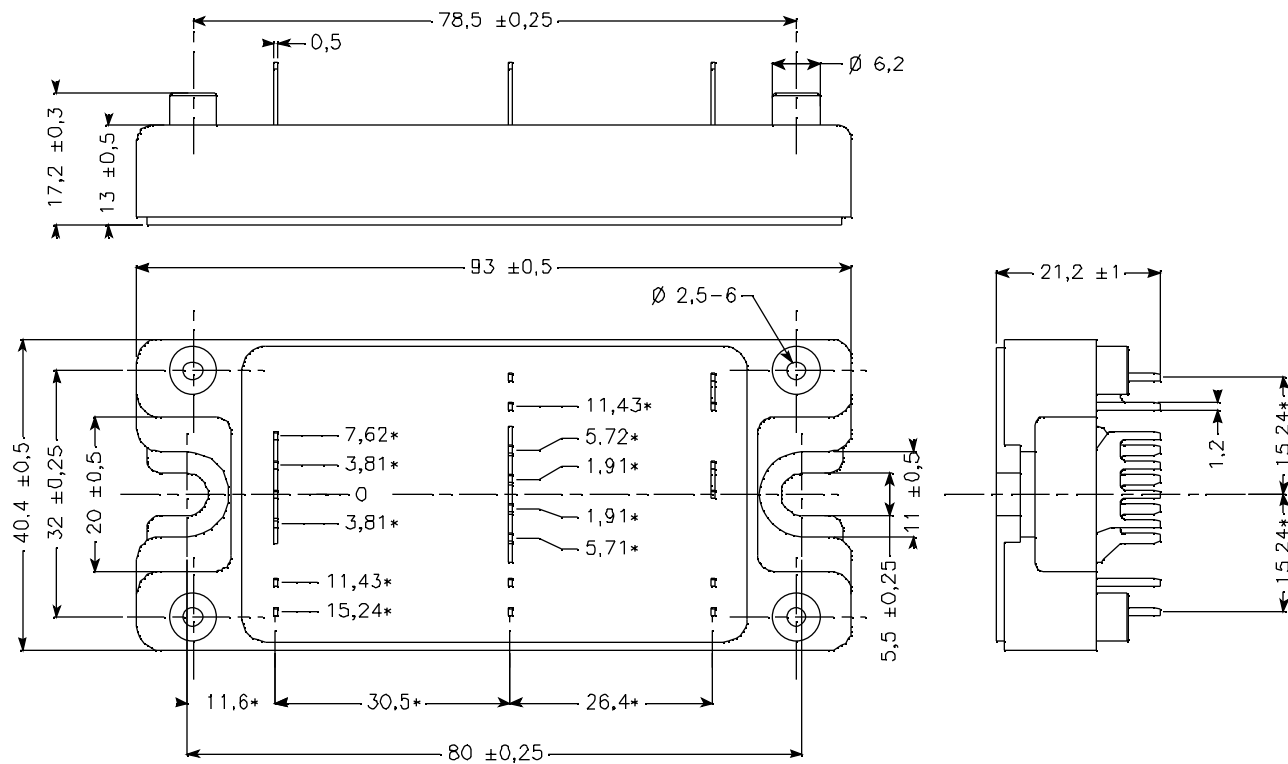
## Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

| Symbol             | Characteristic             | Min | Typ  | Max | Unit |
|--------------------|----------------------------|-----|------|-----|------|
| R <sub>25</sub>    | Resistance @ 25°C          |     | 50   |     | kΩ   |
| B <sub>25/85</sub> | T <sub>25</sub> = 298.15 K |     | 3952 |     | K    |

$$R_T = \frac{R_{25}}{\exp \left[ B_{25/85} \left( \frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

T: Thermistor temperature  
R<sub>T</sub>: Thermistor value at T

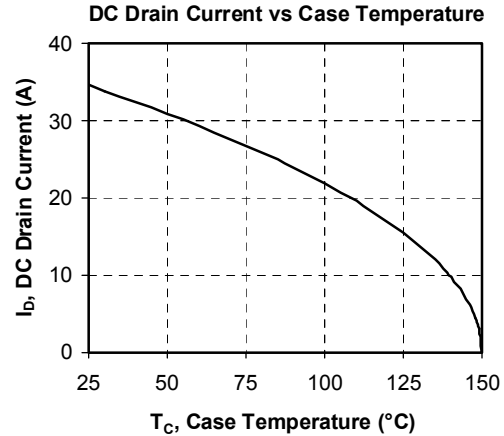
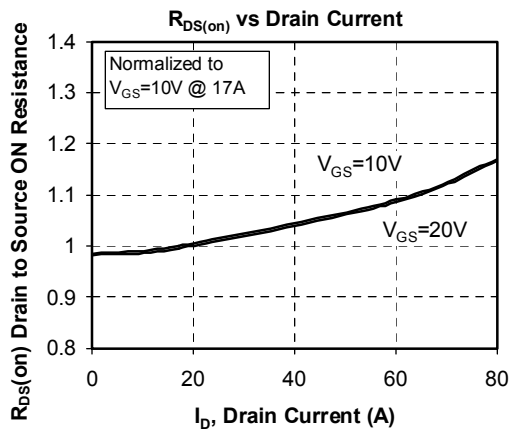
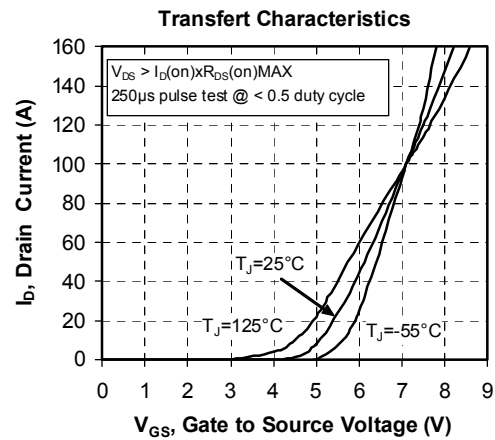
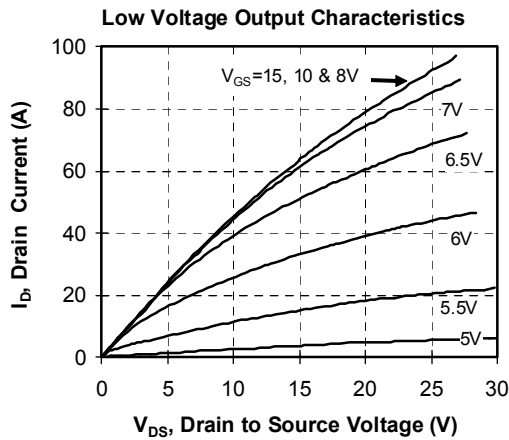
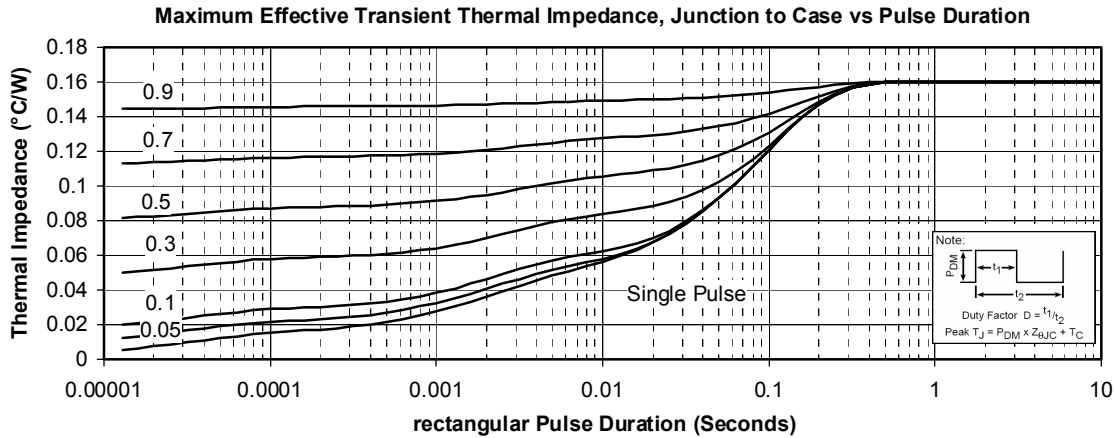
## SP4 Package outline (dimensions in mm)

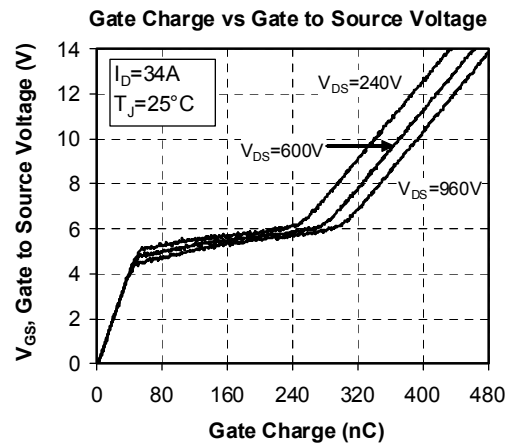
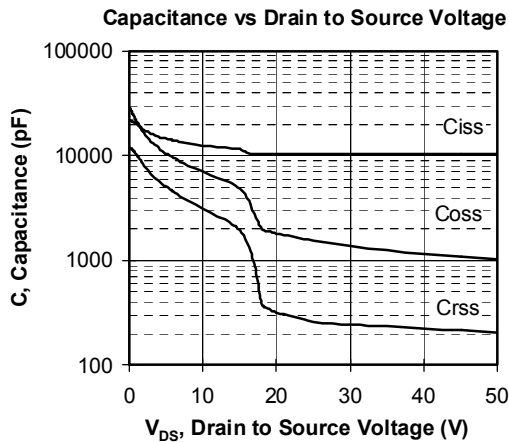
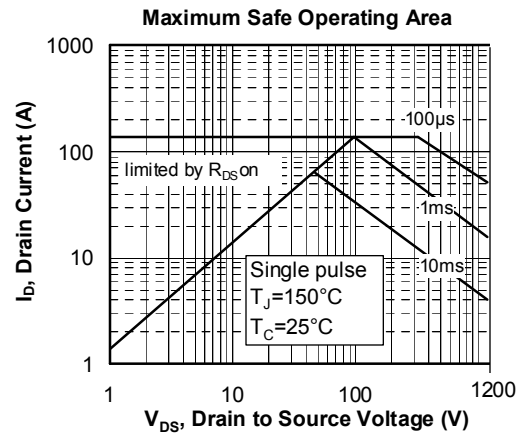
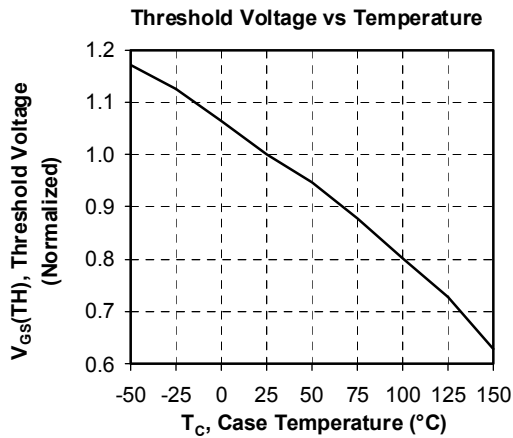
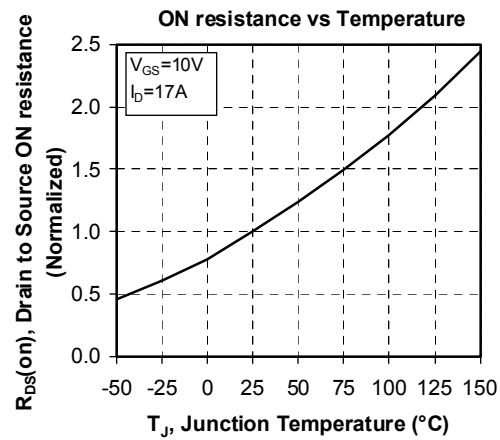
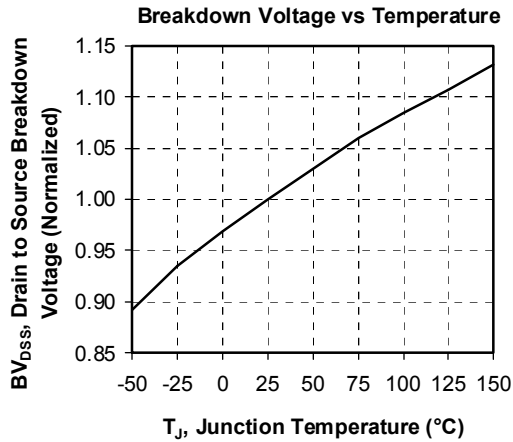


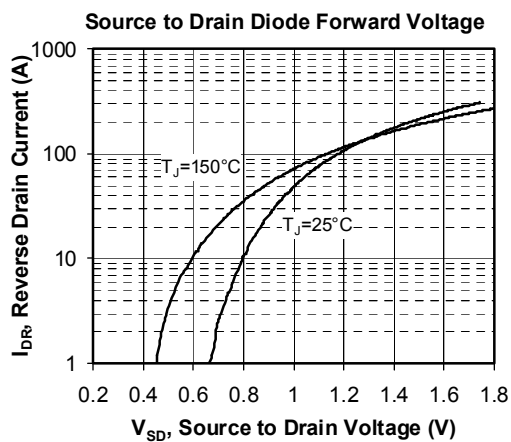
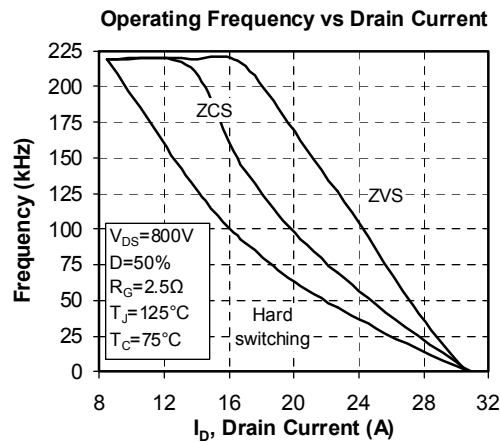
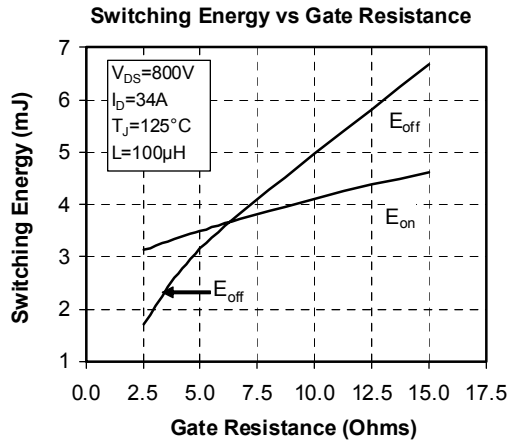
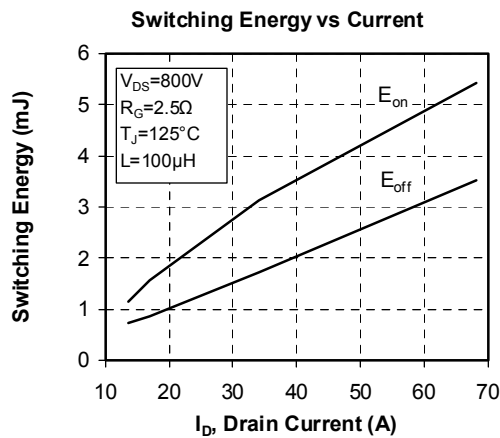
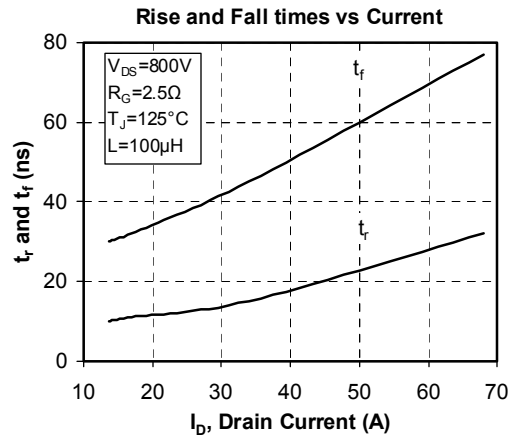
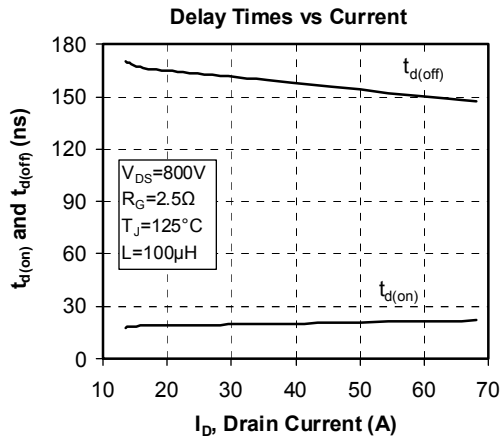
ALL DIMENSIONS MARKED "\*" ARE TOLERENCED AS:  $\pm 0,1$

See application note APT0501 - Mounting Instructions for SP4 Power Modules on [www.microsemi.com](http://www.microsemi.com)

## Typical Performance Curve







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