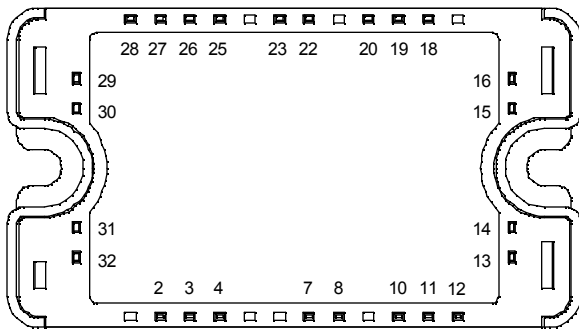
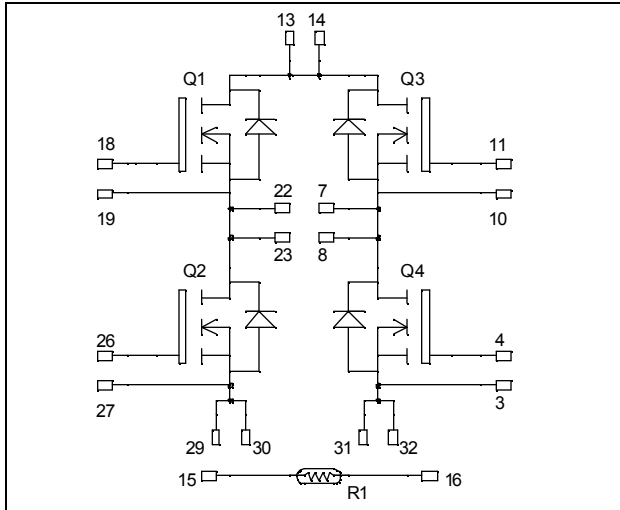


## Full - Bridge MOSFET Power Module

$V_{DSS} = 500V$

$R_{DSon} = 140m\Omega$  typ @  $T_j = 25^\circ C$

$I_D = 26A$  @  $T_c = 25^\circ C$



All multiple inputs and outputs must be shorted together  
 Example: 13/14 ; 29/30 ; 22/23 ...

### Application

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

### Features

- Power MOS 7<sup>®</sup> FREDFETs
  - Low  $R_{DSon}$
  - Low input and Miller capacitance
  - Low gate charge
  - Fast intrinsic reverse diode
  - Avalanche energy rated
  - Very rugged
- Kelvin source for easy drive
- Very low stray inductance
  - Symmetrical design
- 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
- Each leg can be easily paralleled to achieve a phase leg of twice the current capability
- RoHS Compliant

### Absolute maximum ratings

| Symbol     | Parameter                                         | Max ratings        | Unit      |
|------------|---------------------------------------------------|--------------------|-----------|
| $V_{DSS}$  | Drain - Source Breakdown Voltage                  | 500                | V         |
| $I_D$      | Continuous Drain Current                          | $T_c = 25^\circ C$ | 26        |
|            |                                                   | $T_c = 80^\circ C$ | 18        |
| $I_{DM}$   | Pulsed Drain current                              | 105                | A         |
| $V_{GS}$   | Gate - Source Voltage                             | $\pm 30$           | V         |
| $R_{DSon}$ | Drain - Source ON Resistance                      | 168                | $m\Omega$ |
| $P_D$      | Maximum Power Dissipation                         | $T_c = 25^\circ C$ | 208       |
| $I_{AR}$   | Avalanche current (repetitive and non repetitive) | 35                 | A         |
| $E_{AR}$   | Repetitive Avalanche Energy                       | 30                 | mJ        |
| $E_{AS}$   | Single Pulse Avalanche Energy                     | 1300               |           |

**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 | $V_{GS} = 0V, V_{DS} = 500V, T_j = 25^\circ\text{C}$  |     |     | 100       | $\mu\text{A}$    |
|              |                                 | $V_{GS} = 0V, V_{DS} = 400V, T_j = 125^\circ\text{C}$ |     |     | 500       |                  |
| $R_{DS(on)}$ | Drain – Source on Resistance    | $V_{GS} = 10V, I_D = 13A$                             |     | 140 | 168       | $\text{m}\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage          | $V_{GS} = V_{DS}, I_D = 1\text{mA}$                   | 3   |     | 5         | V                |
| $I_{GSS}$    | Gate – Source Leakage Current   | $V_{GS} = \pm 30V, V_{DS} = 0V$                       |     |     | $\pm 100$ | nA               |

**Dynamic Characteristics**

| Symbol       | Characteristic               | Test Conditions                                                                                                                     | Min | Typ  | Max | Unit          |
|--------------|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-----|------|-----|---------------|
| $C_{iss}$    | Input Capacitance            | $V_{GS} = 0V$                                                                                                                       |     | 3259 |     | pF            |
| $C_{oss}$    | Output Capacitance           | $V_{DS} = 25V$                                                                                                                      |     | 709  |     |               |
| $C_{rss}$    | Reverse Transfer Capacitance | $f = 1\text{MHz}$                                                                                                                   |     | 51   |     |               |
| $Q_g$        | Total gate Charge            | $V_{GS} = 10V$                                                                                                                      |     | 72   |     | nC            |
| $Q_{gs}$     | Gate – Source Charge         | $V_{Bus} = 250V$                                                                                                                    |     | 20   |     |               |
| $Q_{gd}$     | Gate – Drain Charge          | $I_D = 26A$                                                                                                                         |     | 36   |     |               |
| $T_{d(on)}$  | Turn-on Delay Time           | <b>Inductive switching @ <math>125^\circ\text{C}</math></b><br>$V_{GS} = 15V$<br>$V_{Bus} = 333V$<br>$I_D = 26A$<br>$R_G = 5\Omega$ |     | 10   |     | ns            |
| $T_r$        | Rise Time                    |                                                                                                                                     |     | 17   |     |               |
| $T_{d(off)}$ | Turn-off Delay Time          |                                                                                                                                     |     | 50   |     |               |
| $T_f$        | Fall Time                    |                                                                                                                                     |     | 41   |     |               |
| $E_{on}$     | Turn-on Switching Energy     | <b>Inductive switching @ <math>25^\circ\text{C}</math></b><br>$V_{GS} = 15V, V_{Bus} = 333V$<br>$I_D = 26A, R_G = 5\Omega$          |     | 326  |     | $\mu\text{J}$ |
| $E_{off}$    | Turn-off Switching Energy    |                                                                                                                                     |     | 250  |     |               |
| $E_{on}$     | Turn-on Switching Energy     | <b>Inductive switching @ <math>125^\circ\text{C}</math></b><br>$V_{GS} = 15V, V_{Bus} = 333V$<br>$I_D = 26A, R_G = 5\Omega$         |     | 548  |     | $\mu\text{J}$ |
| $E_{off}$    | Turn-off Switching Energy    |                                                                                                                                     |     | 288  |     |               |

**Source - Drain diode ratings and characteristics**

| Symbol   | Characteristic                         | Test Conditions                                            | Min                       | Typ | Max | Unit          |
|----------|----------------------------------------|------------------------------------------------------------|---------------------------|-----|-----|---------------|
| $I_S$    | Continuous Source current (Body diode) | $T_c = 25^\circ\text{C}$                                   |                           | 26  |     | A             |
|          |                                        | $T_c = 80^\circ\text{C}$                                   |                           | 18  |     |               |
| $V_{SD}$ | Diode Forward Voltage                  | $V_{GS} = 0V, I_S = -26A$                                  |                           |     | 1.3 | V             |
| $dv/dt$  | Peak Diode Recovery ❶                  |                                                            |                           |     | 15  | V/ns          |
| $t_{rr}$ | Reverse Recovery Time                  | $I_S = -26A$<br>$V_R = 333V$<br>$di/dt = 100A/\mu\text{s}$ | $T_j = 25^\circ\text{C}$  |     | 250 | ns            |
|          |                                        |                                                            | $T_j = 125^\circ\text{C}$ |     | 525 |               |
| $Q_{rr}$ | Reverse Recovery Charge                | $I_S = -26A$<br>$V_R = 333V$<br>$di/dt = 100A/\mu\text{s}$ | $T_j = 25^\circ\text{C}$  | 1.6 |     | $\mu\text{C}$ |
|          |                                        |                                                            | $T_j = 125^\circ\text{C}$ | 6   |     |               |

❶  $dv/dt$  numbers reflect the limitations of the circuit rather than the device itself.

$I_S \leq -26A$      $di/dt \leq 700A/\mu\text{s}$      $V_R \leq V_{DSS}$      $T_j \leq 150^\circ\text{C}$

**Thermal and package characteristics**

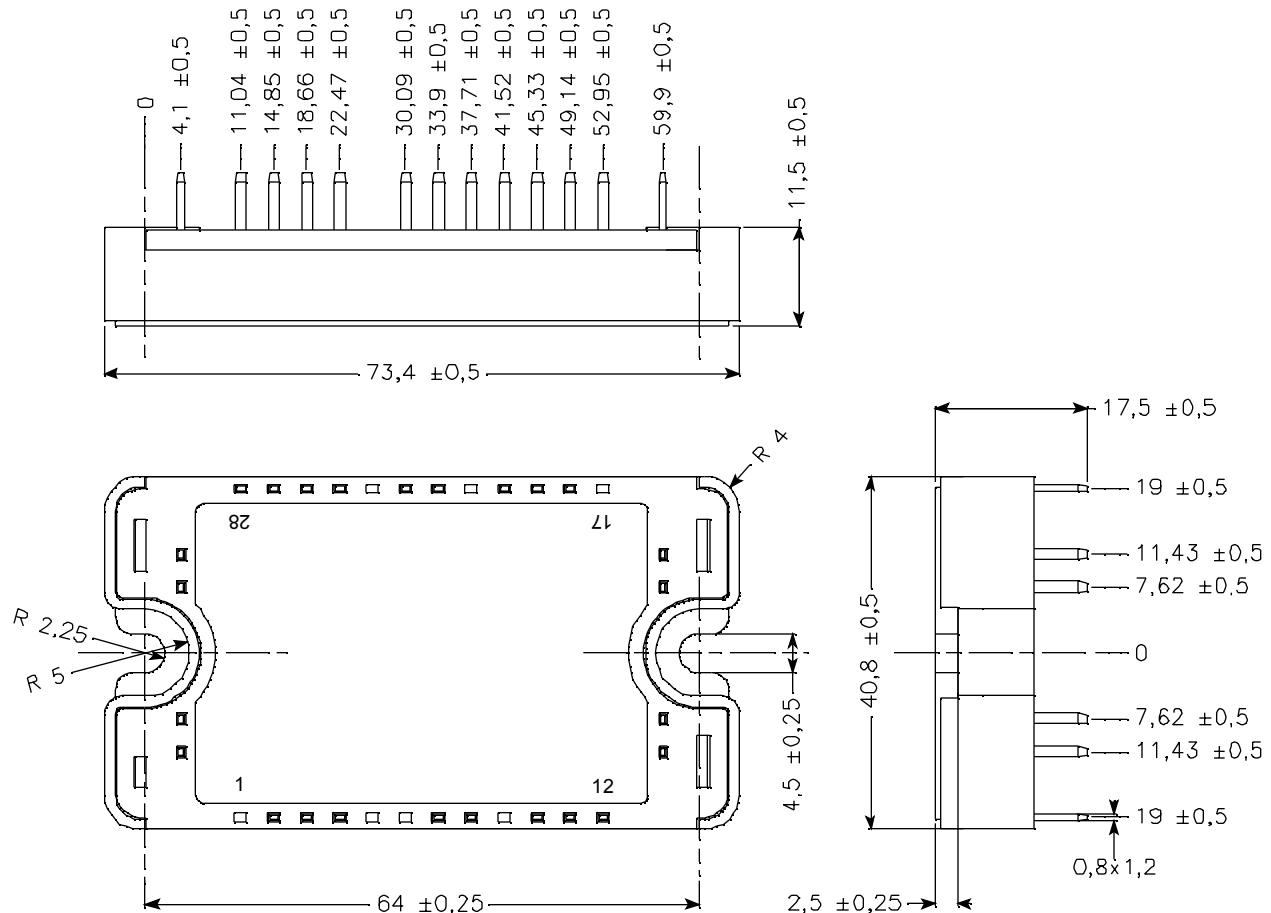
| Symbol            | Characteristic                                                            |             |    | Min  | Typ | Max  | Unit |
|-------------------|---------------------------------------------------------------------------|-------------|----|------|-----|------|------|
| R <sub>thJC</sub> | Junction to Case Thermal Resistance                                       |             |    |      |     | 0.60 | °C/W |
| V <sub>ISOL</sub> | RMS Isolation Voltage, any terminal to case t =1 min, I isol<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 | M4 | 2.5  |     | 4.7  | N.m  |
| Wt                | Package Weight                                                            |             |    |      |     | 110  | g    |

**Temperature sensor NTC** (see application note APT0406 on [www.microsemi.com](http://www.microsemi.com) for more information).

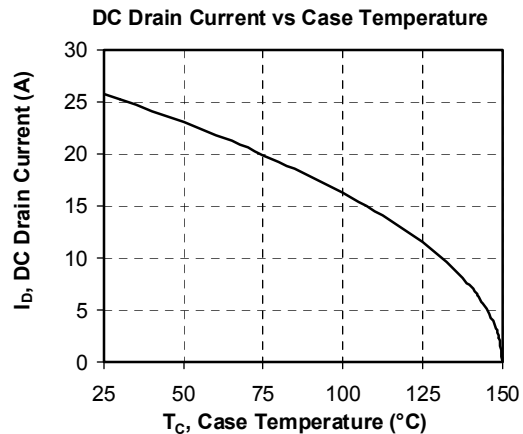
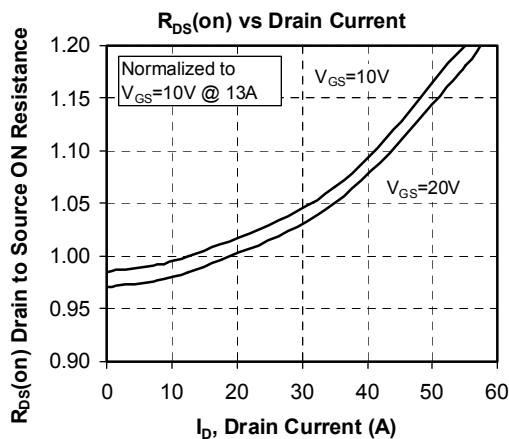
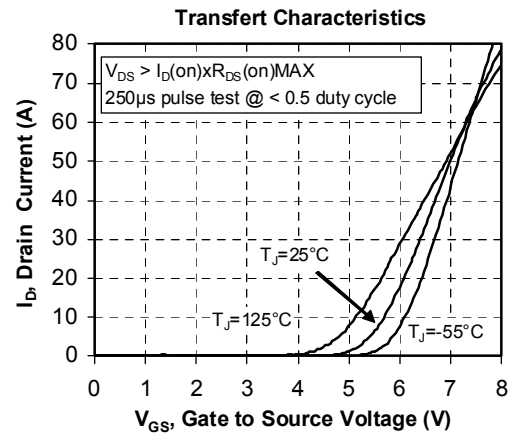
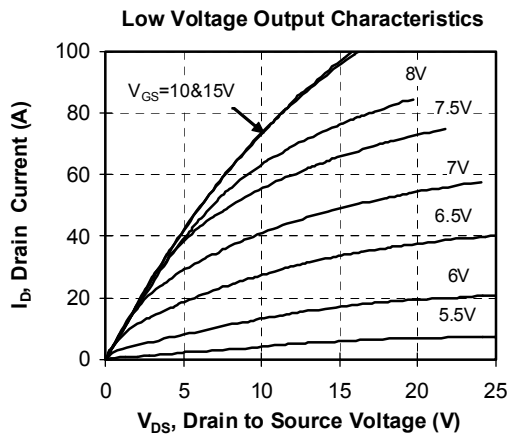
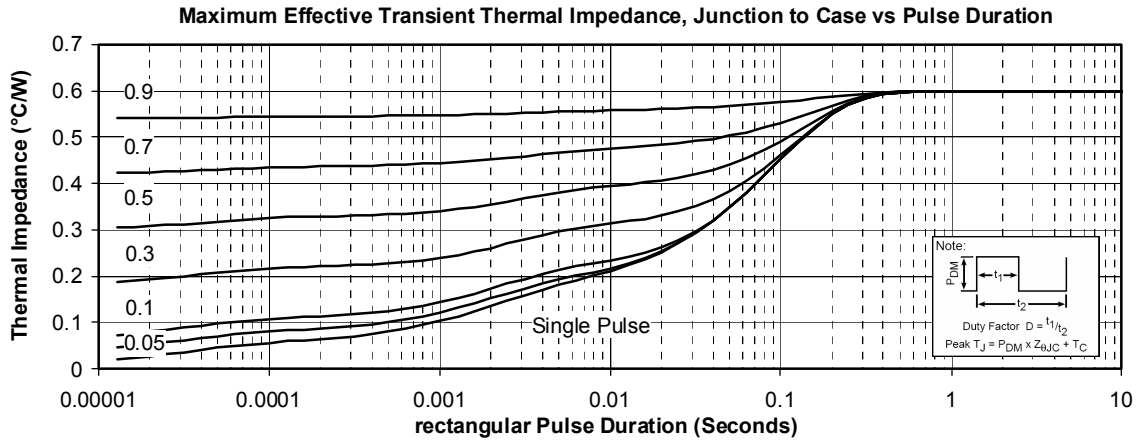
| Symbol             | Characteristic             | Min | Typ  | Max | Unit |
|--------------------|----------------------------|-----|------|-----|------|
| R <sub>25</sub>    | Resistance @ 25°C          |     | 50   |     | kΩ   |
| B <sub>25/85</sub> | T <sub>25</sub> = 298.15 K |     | 3952 |  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

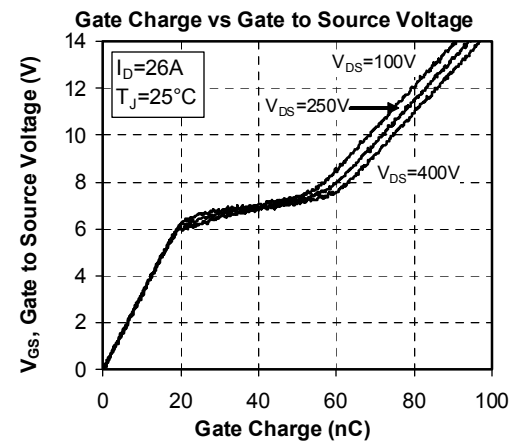
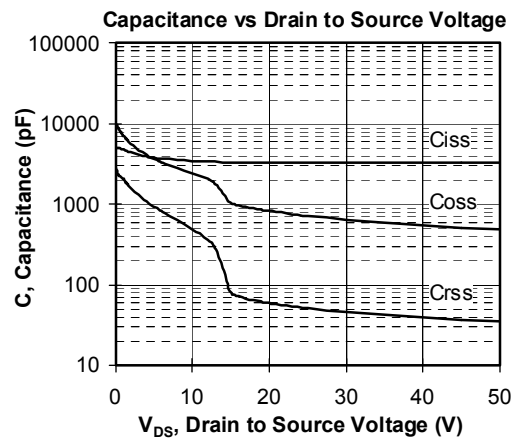
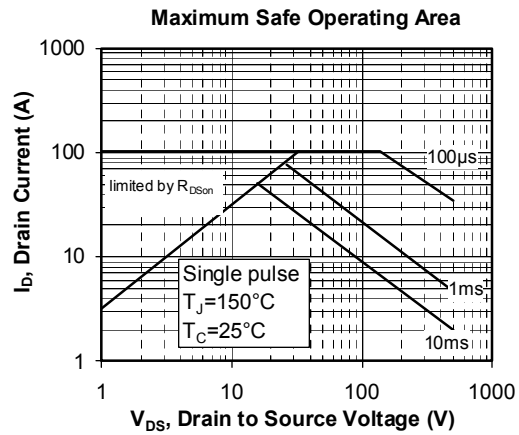
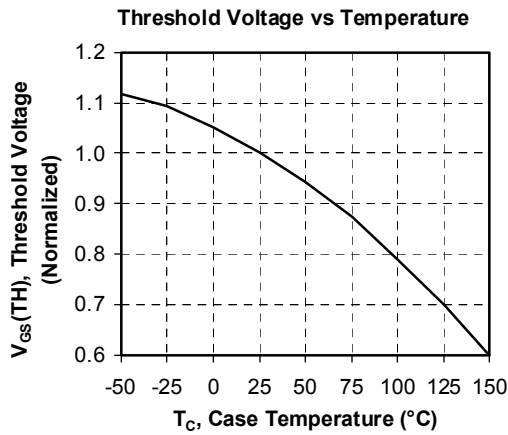
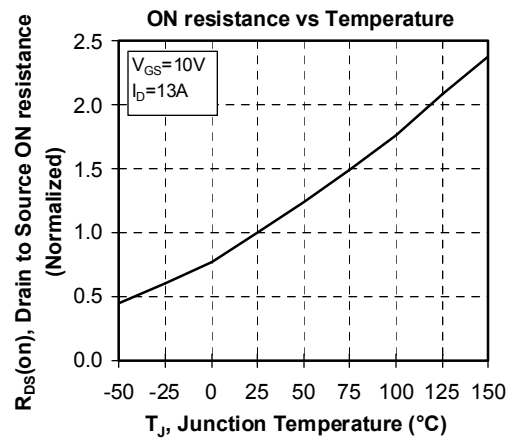
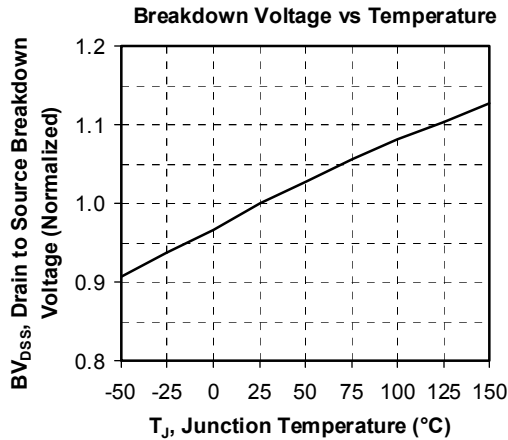
$$R_T = \frac{R_{25}}{\exp \left[ B_{25/85} \left( \frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

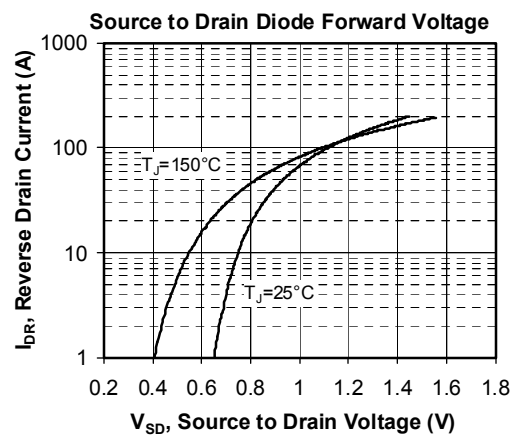
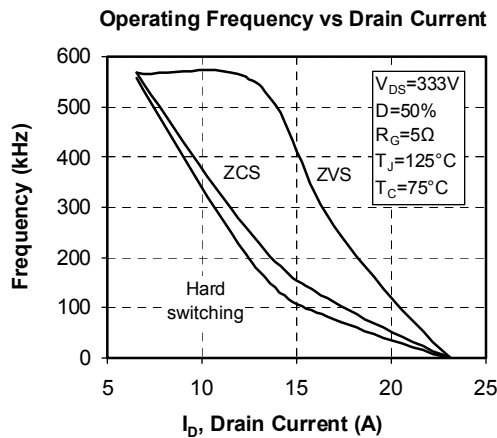
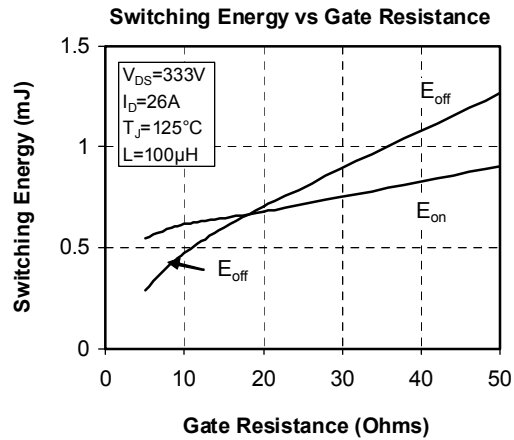
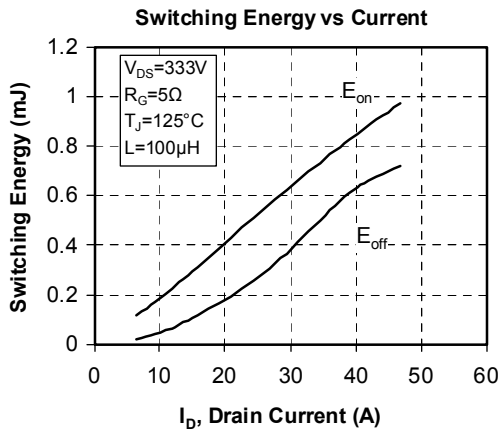
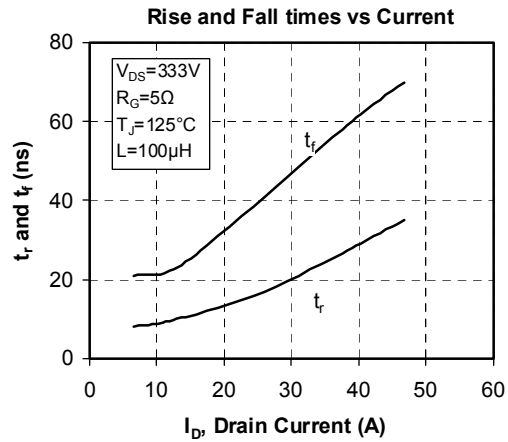
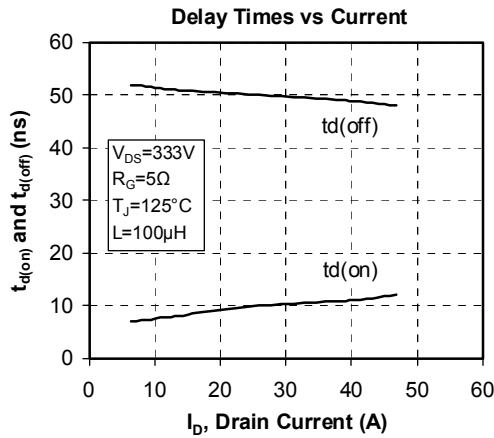
T: Thermistor temperature  
 R<sub>T</sub>: Thermistor value at T

**SP3 Package outline** (dimensions in mm)

 See application note 1901 - Mounting Instructions for SP3 Power Modules on [www.microsemi.com](http://www.microsemi.com)

## Typical Performance Curve







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