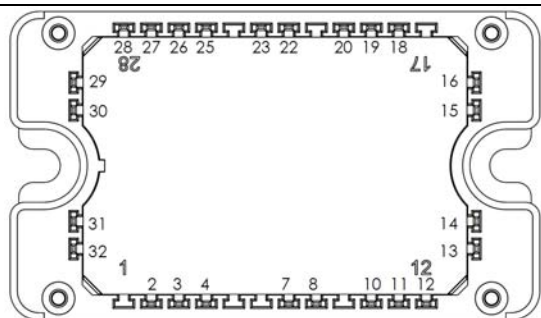
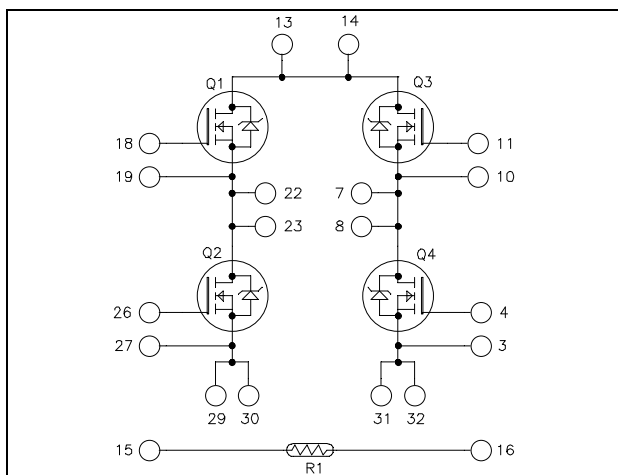


## Full - Bridge MOSFET Power Module

$V_{DSS} = 100V$

$R_{DSon} = 19m\Omega$  typ @  $T_j = 25^\circ C$

$I_D = 70A$  @  $T_c = 25^\circ C$



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
- Motor control

### Features

- **Power MOS V<sup>®</sup> FREDFETs**
  - Low  $R_{DSon}$
  - Low input and Miller capacitance
  - Low gate charge
  - Fast intrinsic diode
  - Avalanche energy rated
  - Very rugged
- Kelvin source for easy drive
- Very low stray inductance
- Internal thermistor for temperature monitoring

### 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

**All ratings @  $T_j = 25^\circ C$  unless otherwise specified**

### Absolute maximum ratings (per MOSFET)

| Symbol     | Parameter                                         | Max ratings        | Unit      |
|------------|---------------------------------------------------|--------------------|-----------|
| $V_{DSS}$  | Drain - Source Voltage                            | 100                | V         |
| $I_D$      | Continuous Drain Current                          | $T_c = 25^\circ C$ | 70        |
|            |                                                   | $T_c = 80^\circ C$ | 50        |
| $I_{DM}$   | Pulsed Drain current                              | 300                | A         |
| $V_{GS}$   | Gate - Source Voltage                             | $\pm 30$           | V         |
| $R_{DSon}$ | Drain - Source ON Resistance                      | 21                 | $m\Omega$ |
| $P_D$      | Power Dissipation                                 | $T_c = 25^\circ C$ | 208       |
| $I_{AR}$   | Avalanche current (repetitive and non repetitive) | 75                 | A         |
| $E_{AR}$   | Repetitive Avalanche Energy                       | 30                 | mJ        |
| $E_{AS}$   | Single Pulse Avalanche Energy                     | 1500               |           |

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

**Electrical Characteristics** (per MOSFET)

| Symbol       | Characteristic                  | Test Conditions                 | Min | Typ | Max       | Unit      |
|--------------|---------------------------------|---------------------------------|-----|-----|-----------|-----------|
| $I_{DSS}$    | Zero Gate Voltage Drain Current | $V_{GS} = 0V, V_{DS} = 100V$    |     |     | 250       | $\mu A$   |
| $R_{DS(on)}$ | Drain – Source on Resistance    | $V_{GS} = 10V, I_D = 35A$       |     | 19  | 21        | $m\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage          | $V_{GS} = V_{DS}, I_D = 1mA$    | 2   |     | 4         | V         |
| $I_{GSS}$    | Gate – Source Leakage Current   | $V_{GS} = \pm 30V, V_{DS} = 0V$ |     |     | $\pm 150$ | nA        |

**Dynamic Characteristics** (per MOSFET)

| Symbol       | Characteristic                      | Test Conditions                                                                                           | Min | Typ  | Max | Unit          |
|--------------|-------------------------------------|-----------------------------------------------------------------------------------------------------------|-----|------|-----|---------------|
| $C_{iss}$    | Input Capacitance                   | $V_{GS} = 0V$                                                                                             |     | 5100 |     | pF            |
| $C_{oss}$    | Output Capacitance                  | $V_{DS} = 25V$                                                                                            |     | 1900 |     |               |
| $C_{rss}$    | Reverse Transfer Capacitance        | $f = 1MHz$                                                                                                |     | 800  |     |               |
| $Q_g$        | Total gate Charge                   | $V_{GS} = 10V$<br>$V_{Bus} = 100V$<br>$I_D = 70A$                                                         |     | 200  |     | nC            |
| $Q_{gs}$     | Gate – Source Charge                |                                                                                                           |     | 40   |     |               |
| $Q_{gd}$     | Gate – Drain Charge                 |                                                                                                           |     | 92   |     |               |
| $T_{d(on)}$  | Turn-on Delay Time                  | <b>Inductive switching @ 125°C</b><br>$V_{GS} = 15V$<br>$V_{Bus} = 66V$<br>$I_D = 70A$<br>$R_G = 5\Omega$ |     | 35   |     | ns            |
| $T_r$        | Rise Time                           |                                                                                                           |     | 70   |     |               |
| $T_{d(off)}$ | Turn-off Delay Time                 |                                                                                                           |     | 95   |     |               |
| $T_f$        | Fall Time                           |                                                                                                           |     | 125  |     |               |
| $E_{on}$     | Turn-on Switching Energy            | <b>Inductive switching @ 25°C</b><br>$V_{GS} = 15V, V_{Bus} = 66V$<br>$I_D = 70A, R_G = 5\Omega$          |     | 276  |     | $\mu J$       |
| $E_{off}$    | Turn-off Switching Energy           |                                                                                                           |     | 302  |     |               |
| $E_{on}$     | Turn-on Switching Energy            | <b>Inductive switching @ 125°C</b><br>$V_{GS} = 15V, V_{Bus} = 66V$<br>$I_D = 70A, R_G = 5\Omega$         |     | 304  |     | $\mu J$       |
| $E_{off}$    | Turn-off Switching Energy           |                                                                                                           |     | 320  |     |               |
| $R_{thJC}$   | Junction to Case Thermal Resistance |                                                                                                           |     |      | 0.6 | $^{\circ}C/W$ |

**Source - Drain diode ratings and characteristics** (per MOSFET)

| Symbol   | Characteristic                         | Test Conditions                                         | Min                  | Typ | Max | Unit    |
|----------|----------------------------------------|---------------------------------------------------------|----------------------|-----|-----|---------|
| $I_S$    | Continuous Source current (Body diode) | $T_c = 25^{\circ}C$                                     |                      |     | 70  | A       |
|          |                                        | $T_c = 80^{\circ}C$                                     |                      |     | 50  |         |
| $V_{SD}$ | Diode Forward Voltage                  | $V_{GS} = 0V, I_S = -70A$                               |                      |     | 1.3 | V       |
| $dv/dt$  | Peak Diode Recovery ❶                  |                                                         |                      |     | 5   | V/ns    |
| $t_{rr}$ | Reverse Recovery Time                  | $I_S = -70A$<br>$V_{Bus} = 66V$<br>$di/dt = 100A/\mu s$ | $T_j = 25^{\circ}C$  |     | 200 | ns      |
|          |                                        |                                                         | $T_j = 125^{\circ}C$ |     | 350 |         |
| $Q_{rr}$ | Reverse Recovery Charge                | $I_S = -70A$<br>$V_{Bus} = 66V$<br>$di/dt = 100A/\mu s$ | $T_j = 25^{\circ}C$  | 0.5 |     | $\mu C$ |
|          |                                        |                                                         | $T_j = 125^{\circ}C$ | 1   |     |         |

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

$I_S \leq -70A$      $di/dt \leq 700A/\mu s$      $V_R \leq V_{DSS}$      $T_j \leq 150^{\circ}C$

**Thermal and package characteristics**

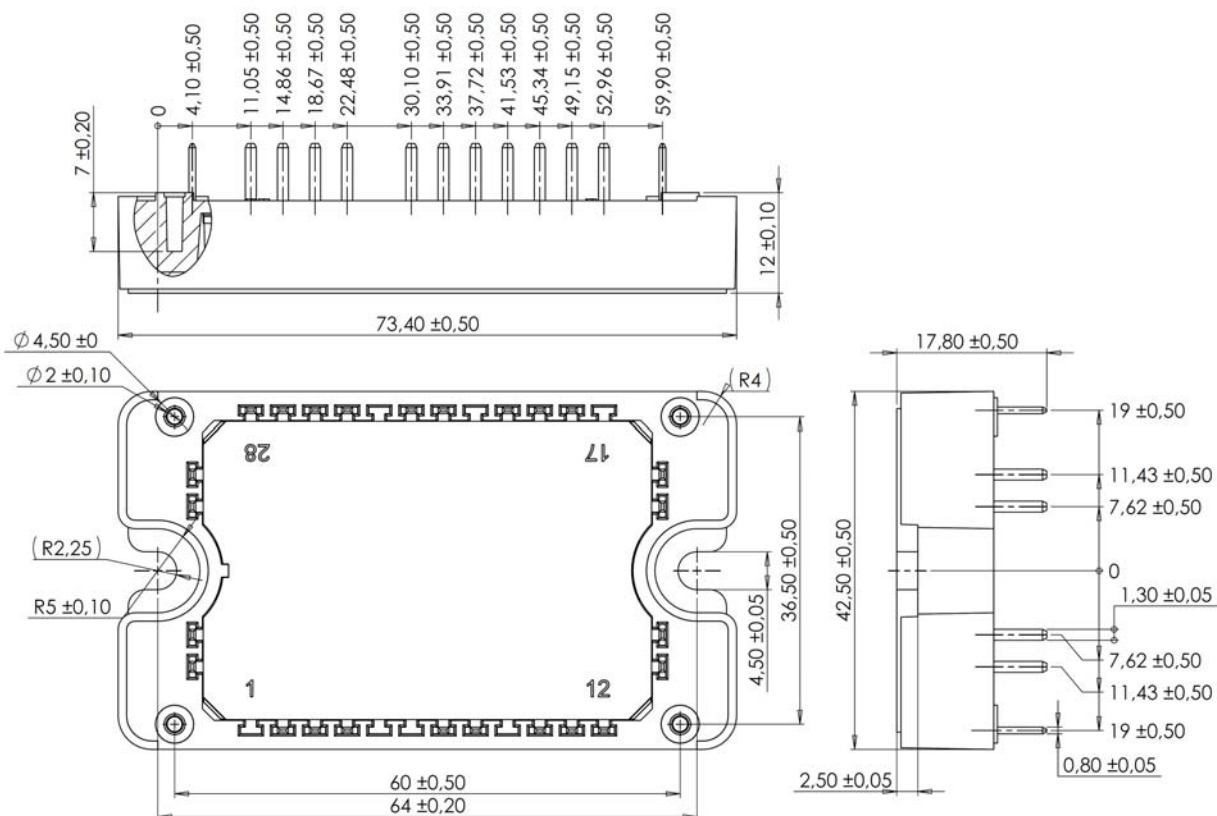
| Symbol            | Characteristic                                               | Min         | Max                    | Unit |
|-------------------|--------------------------------------------------------------|-------------|------------------------|------|
| V <sub>ISOL</sub> | RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz | 4000        |                        | V    |
| T <sub>J</sub>    | Operating junction temperature range                         | -40         | 150                    | °C   |
| T <sub>JOP</sub>  | Recommended junction temperature under switching conditions  | -40         | T <sub>Jmax</sub> - 25 |      |
| T <sub>STG</sub>  | Storage Temperature Range                                    | -40         | 125                    |      |
| T <sub>C</sub>    | Operating Case Temperature                                   | -40         | 125                    |      |
| Torque            | Mounting torque                                              | To heatsink | M4                     | 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).

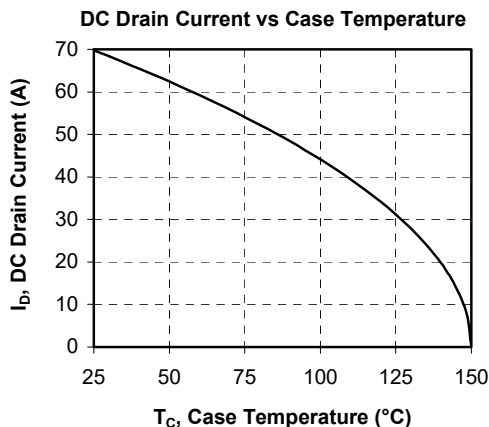
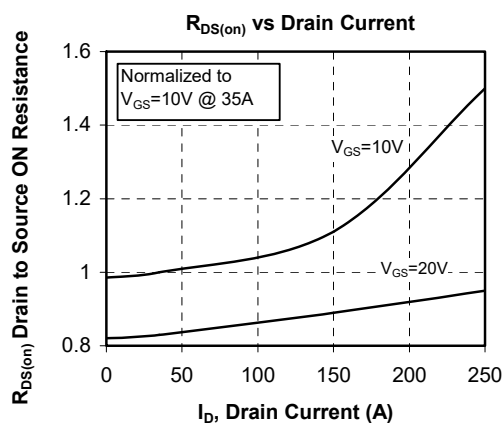
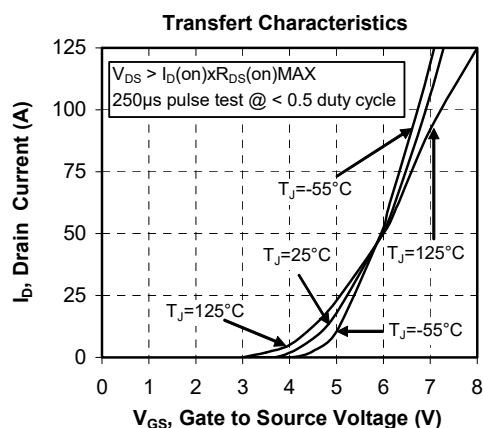
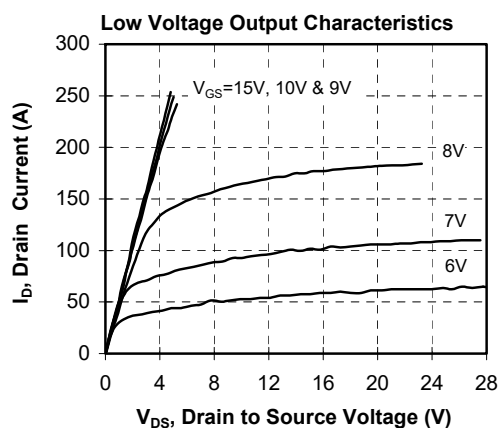
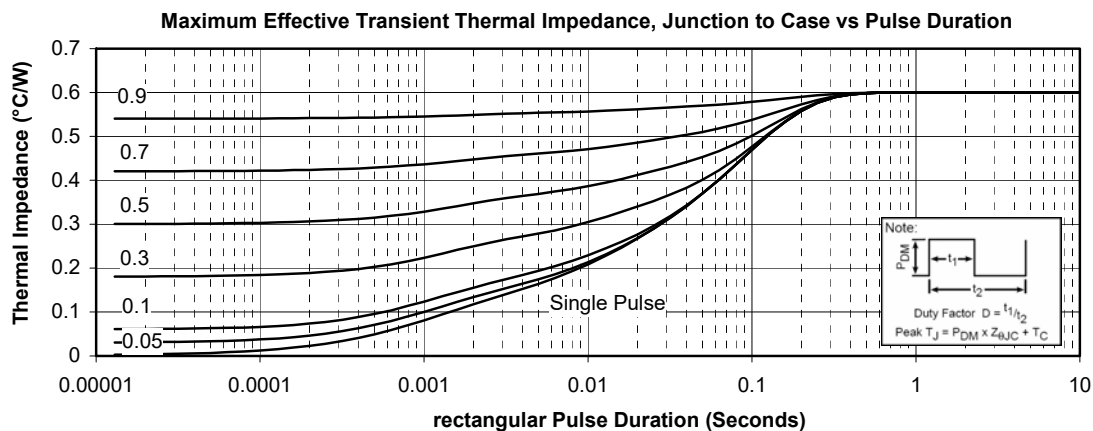
| Symbol                            | Characteristic             | Min | Typ  | Max | Unit |
|-----------------------------------|----------------------------|-----|------|-----|------|
| R <sub>25</sub>                   | Resistance @ 25°C          |     | 50   |     | kΩ   |
| ΔR <sub>25</sub> /R <sub>25</sub> |                            |     | 5    |     | %    |
| B <sub>25/85</sub>                | T <sub>25</sub> = 298.15 K |     | 3952 |     | K    |
| ΔB/B                              | T <sub>C</sub> = 100°C     |     | 4    |     | %    |

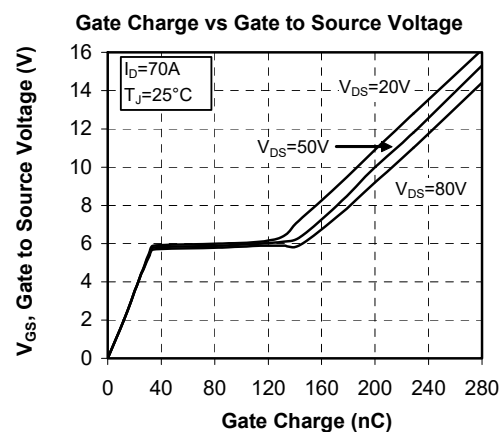
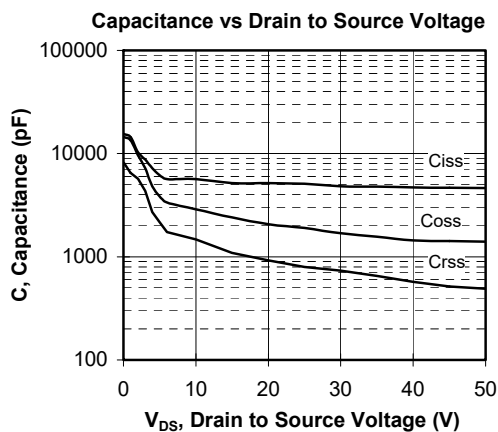
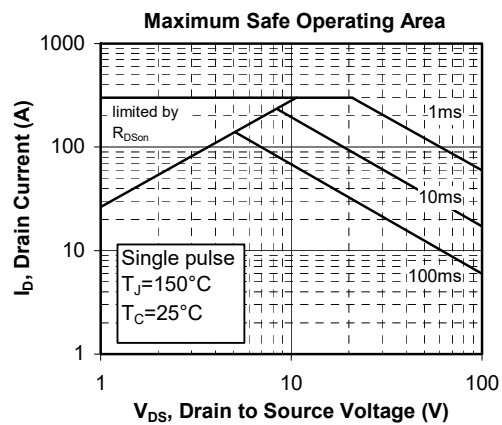
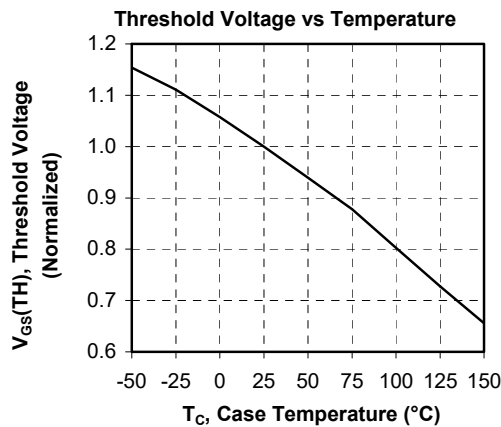
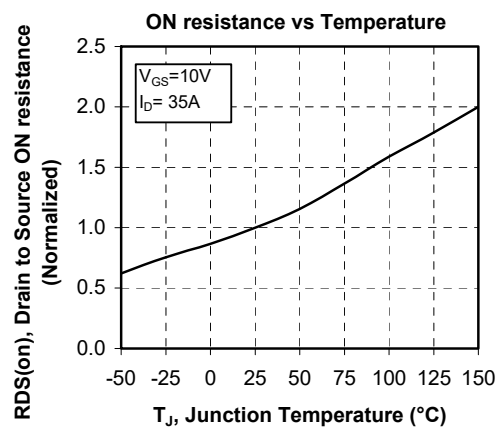
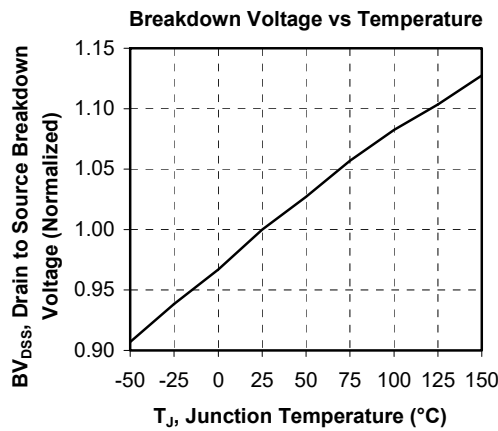
$$R_T = \frac{R_{25}}{\exp \left[ B_{25/85} \left( \frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

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

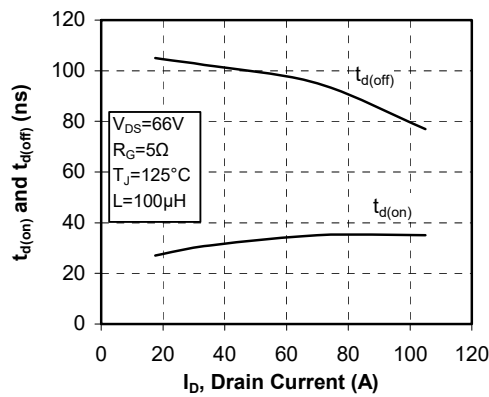
**Package outline** (dimensions in mm)

 See application note 1906 - Mounting Instructions for SP3F Power Modules on [www.microsemi.com](http://www.microsemi.com)

## Typical Performance Curve

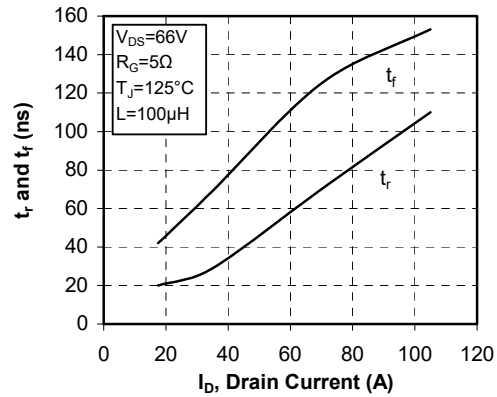




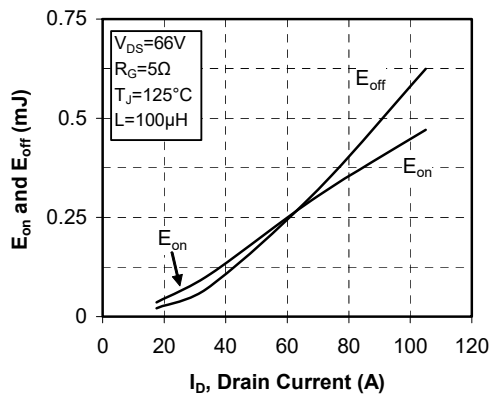
### Delay Times vs Current



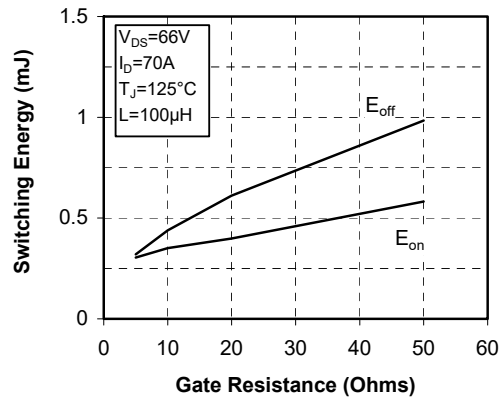
### Rise and Fall times vs Current



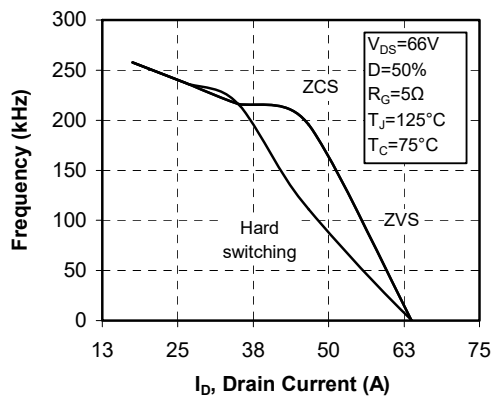
### Switching Energy vs Current



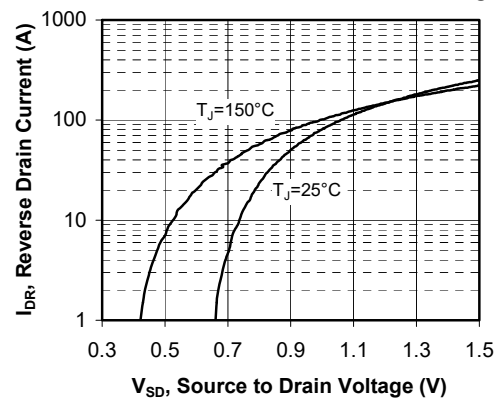
### Switching Energy vs Gate Resistance



### Operating Frequency vs Drain Current



### Source to Drain Diode Forward Voltage



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