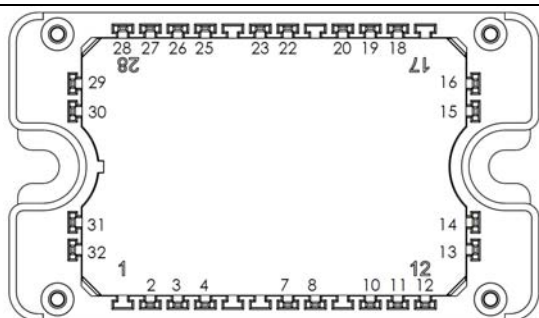
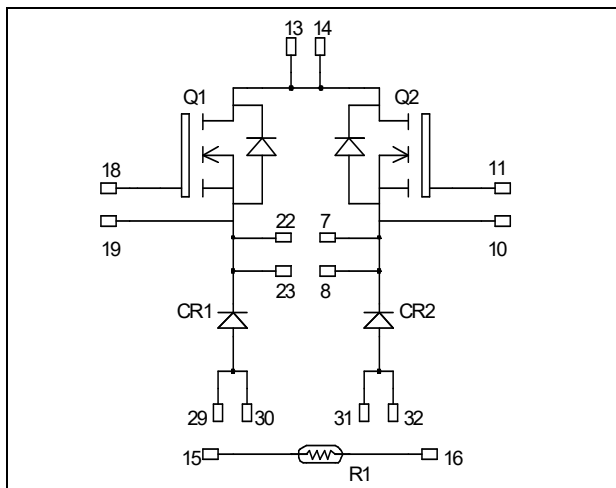


## Dual Buck chopper MOSFET Power Module

$V_{DSS} = 100V$   
 $R_{DSon} = 9m\Omega$  typ @  $T_j = 25^\circ C$   
 $I_D = 139A$  @  $T_c = 25^\circ C$



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

**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                          | $T_c = 25^\circ C$<br>139   | A          |
|            |                                                   | $T_c = 80^\circ C$<br>100 * |            |
| $I_{DM}$   | Pulsed Drain current                              | 430                         |            |
| $V_{GS}$   | Gate - Source Voltage                             | $\pm 30$                    | V          |
| $R_{DSon}$ | Drain - Source ON Resistance                      | 10                          | m $\Omega$ |
| $P_D$      | Power Dissipation                                 | $T_c = 25^\circ C$<br>390   | W          |
| $I_{AR}$   | Avalanche current (repetitive and non repetitive) | 100                         | A          |
| $E_{AR}$   | Repetitive Avalanche Energy                       | 50                          | mJ         |
| $E_{AS}$   | Single Pulse Avalanche Energy                     | 3000                        |            |

\* Specification of MOSFET device but output current must be limited due to size of output pins.

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

### Application

- AC and DC motor control
- Switched Mode Power Supplies

### Features

- **Power MOS V<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
- 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 single buck of twice the current capability
- RoHS Compliant

**Electrical Characteristics (per MOSFET)**

| Symbol       | Characteristic                  | Test Conditions                 | Min | Typ | Max       | Unit      |
|--------------|---------------------------------|---------------------------------|-----|-----|-----------|-----------|
| $I_{DSS}$    | Zero Gate Voltage Drain Current | $V_{GS} = 0V, V_{DS} = 100V$    |     |     | 100       | $\mu A$   |
| $R_{DS(on)}$ | Drain – Source on Resistance    | $V_{GS} = 10V, I_D = 69.5A$     |     | 9   | 10        | $m\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage          | $V_{GS} = V_{DS}, I_D = 2.5mA$  | 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                   | $V_{GS} = 0V$                                                                                              |     | 9875 |      | pF            |
| $C_{oss}$    | Output Capacitance                  | $V_{DS} = 25V$                                                                                             |     | 3940 |      |               |
| $C_{rss}$    | Reverse Transfer Capacitance        | $f = 1MHz$                                                                                                 |     | 1470 |      |               |
| $Q_g$        | Total gate Charge                   | $V_{GS} = 10V$                                                                                             |     | 350  |      | nC            |
| $Q_{gs}$     | Gate – Source Charge                | $V_{Bus} = 50V$                                                                                            |     | 60   |      |               |
| $Q_{gd}$     | Gate – Drain Charge                 | $I_D = 139A$                                                                                               |     | 180  |      |               |
| $T_{d(on)}$  | Turn-on Delay Time                  | <b>Inductive switching @ 125°C</b><br>$V_{GS} = 15V$<br>$V_{Bus} = 66V$<br>$I_D = 139A$<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>$I_D = 139A, R_G = 5\Omega$          |     | 552  |      | $\mu J$       |
| $E_{off}$    | Turn-off Switching Energy           |                                                                                                            |     | 604  |      |               |
| $E_{on}$     | Turn-on Switching Energy            | <b>Inductive switching @ 125°C</b><br>$V_{GS} = 15V, V_{Bus} = 66V$<br>$I_D = 139A, R_G = 5\Omega$         |     | 608  |      | $\mu J$       |
| $E_{off}$    | Turn-off Switching Energy           |                                                                                                            |     | 641  |      |               |
| $R_{thJC}$   | Junction to Case Thermal Resistance |                                                                                                            |     |      | 0.32 | $^{\circ}C/W$ |

**Chopper Diode ratings and characteristics (per diode)**

| Symbol     | Characteristic                      | Test Conditions                                      | Min                  | Typ | Max  | Unit          |
|------------|-------------------------------------|------------------------------------------------------|----------------------|-----|------|---------------|
| $V_{RRM}$  | Peak Repetitive Reverse Voltage     |                                                      |                      |     | 200  | V             |
| $I_{RM}$   | Reverse Leakage Current             | $V_R = 200V$                                         |                      |     | 250  | $\mu A$       |
| $I_F$      | DC Forward Current                  | $T_c = 80^{\circ}C$                                  |                      | 100 |      | A             |
| $V_F$      | Diode Forward Voltage               | $I_F = 100A$                                         |                      | 1   |      | V             |
|            |                                     | $I_F = 200A$                                         |                      | 1.4 |      |               |
|            |                                     | $I_F = 100A, T_j = 125^{\circ}C$                     |                      | 0.9 |      |               |
| $t_{rr}$   | Reverse Recovery Time               | $I_F = 100A$<br>$V_R = 133V$<br>$di/dt = 200A/\mu s$ | $T_j = 25^{\circ}C$  | 60  |      | ns            |
|            |                                     |                                                      | $T_j = 125^{\circ}C$ | 110 |      |               |
| $Q_{rr}$   | Reverse Recovery Charge             | $T_j = 25^{\circ}C$                                  |                      | 200 |      | nC            |
|            |                                     |                                                      | $T_j = 125^{\circ}C$ | 840 |      |               |
| $R_{thJC}$ | Junction to Case Thermal Resistance |                                                      |                      |     | 0.55 | $^{\circ}C/W$ |

**Thermal and package characteristics**

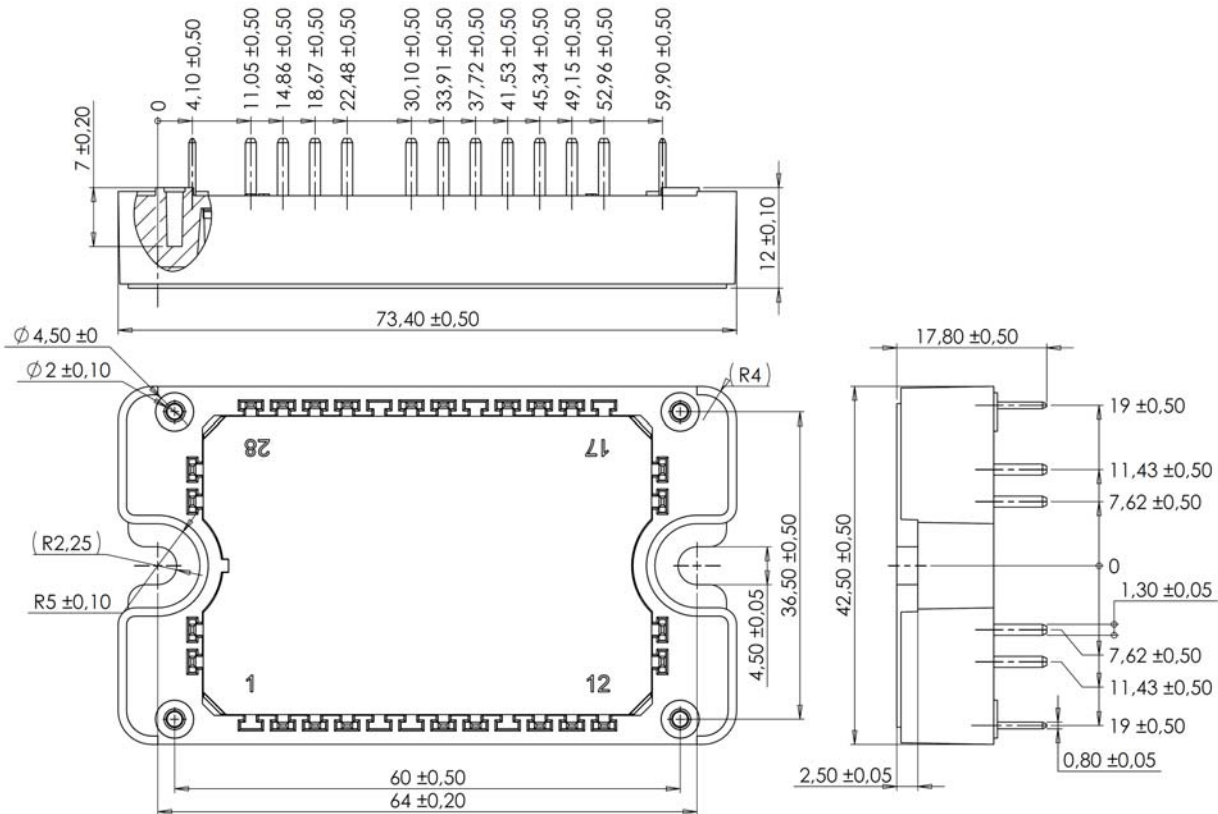
| Symbol            | Characteristic                                               | Min         | Max                    | Unit |
|-------------------|--------------------------------------------------------------|-------------|------------------------|------|
| V <sub>ISOL</sub> | RMS Isolation Voltage, 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    |     | %    |

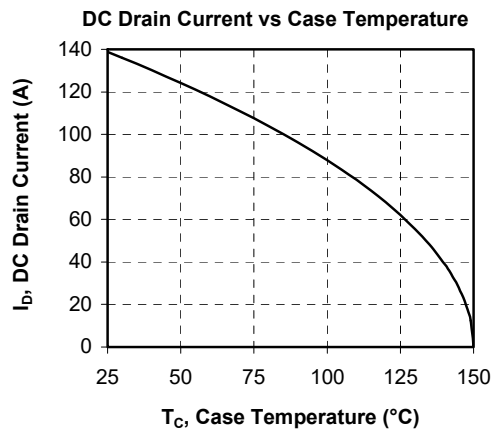
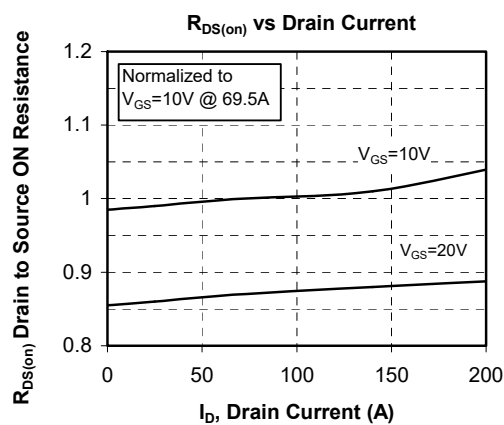
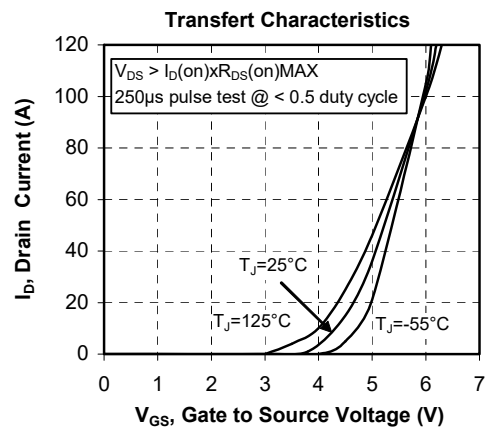
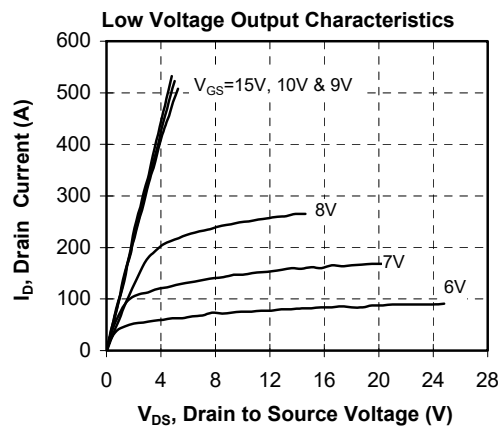
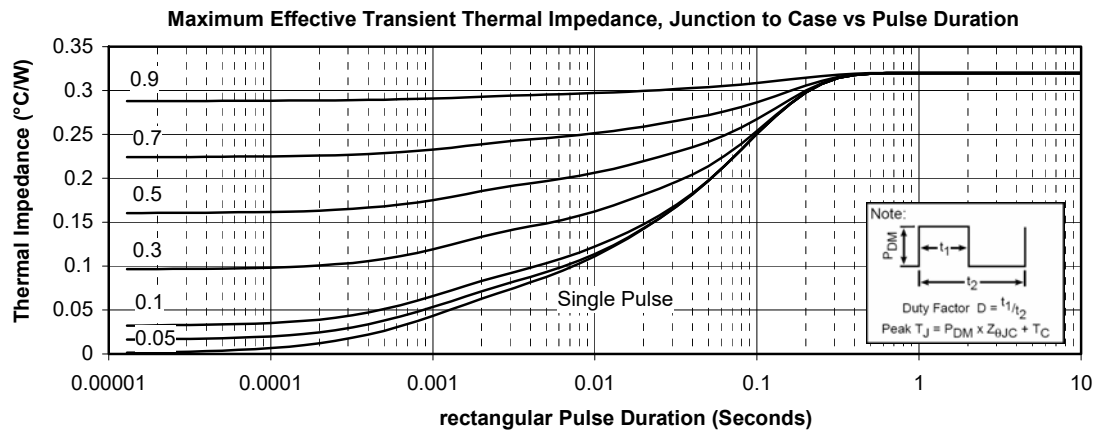
$$R_T = \frac{R_{25}}{\exp \left[ B_{25/85} \left( \frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

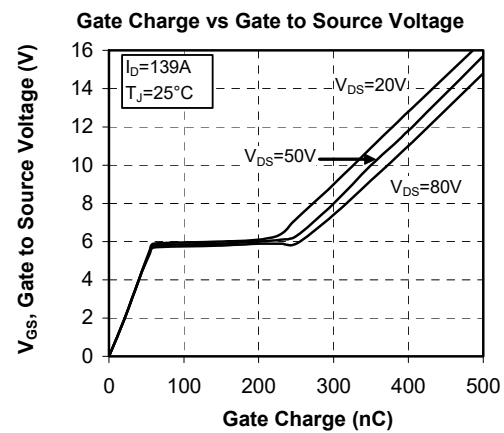
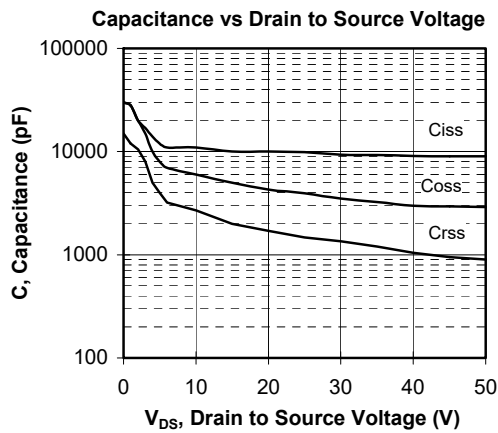
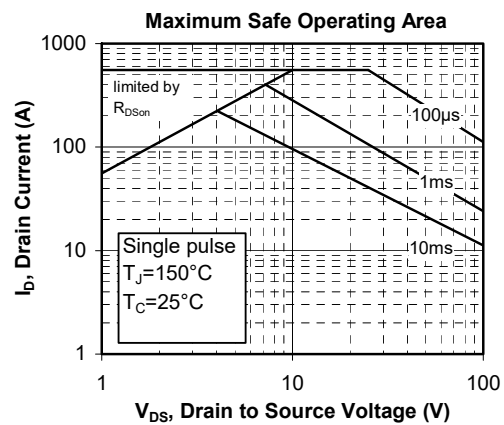
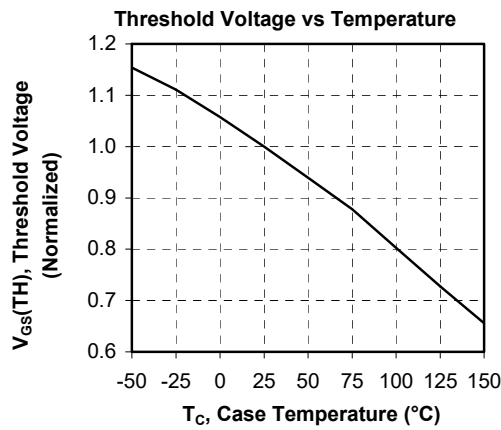
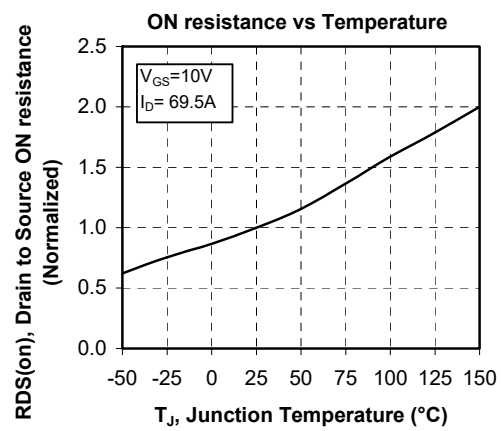
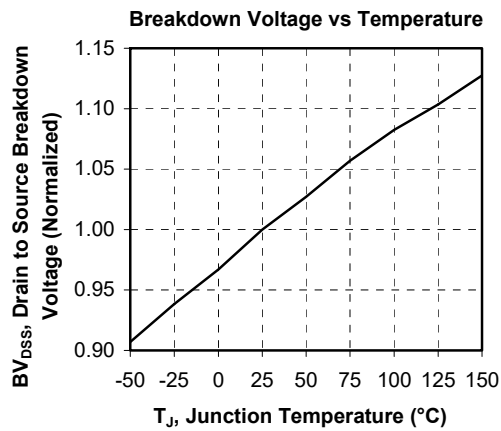
T: Thermistor temperature  
R<sub>T</sub>: Thermistor value at T

**Package outline** (dimensions in mm)


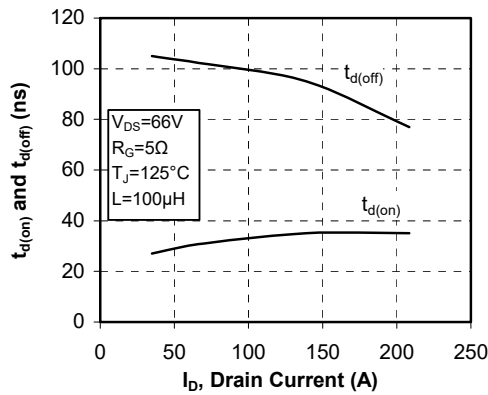
See application note 1906 - Mounting Instructions for SP3F Power Modules on [www.microsemi.com](http://www.microsemi.com)

## Typical Performance Curve

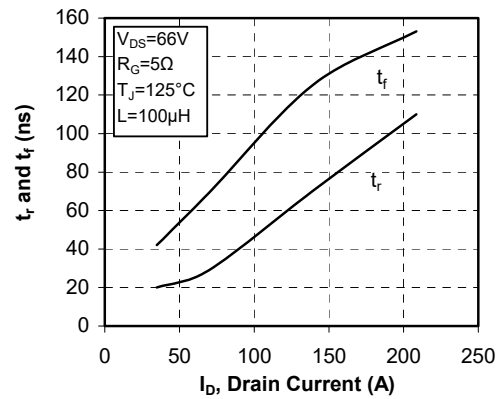




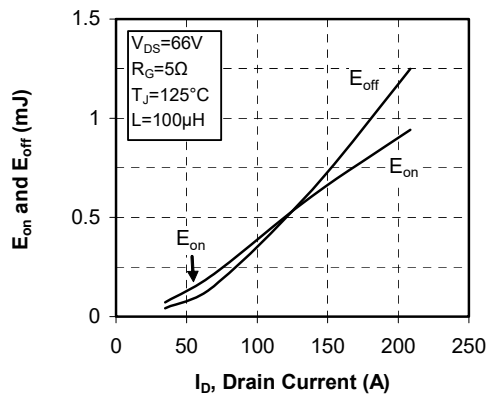
### Delay Times vs Current



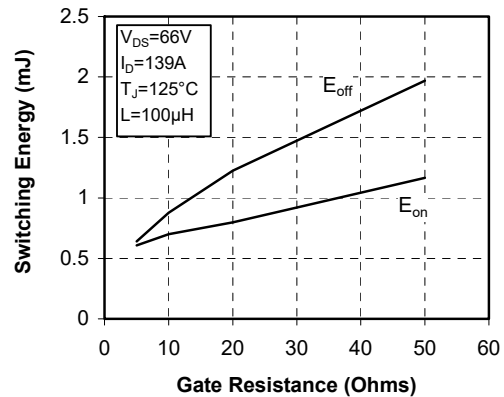
### Rise and Fall times vs Current



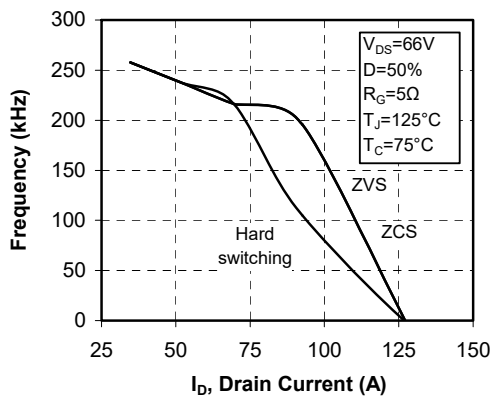
### Switching Energy vs Current



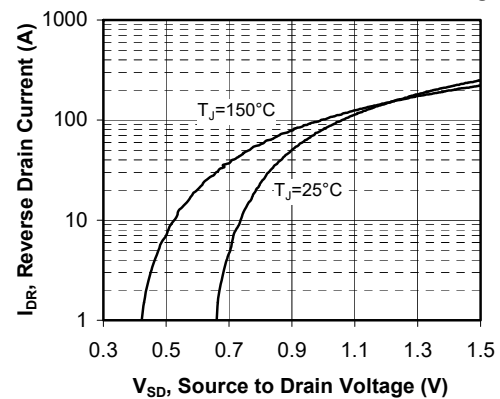
### Switching Energy vs Gate Resistance



### Operating Frequency vs Drain Current



### Source to Drain Diode Forward Voltage



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