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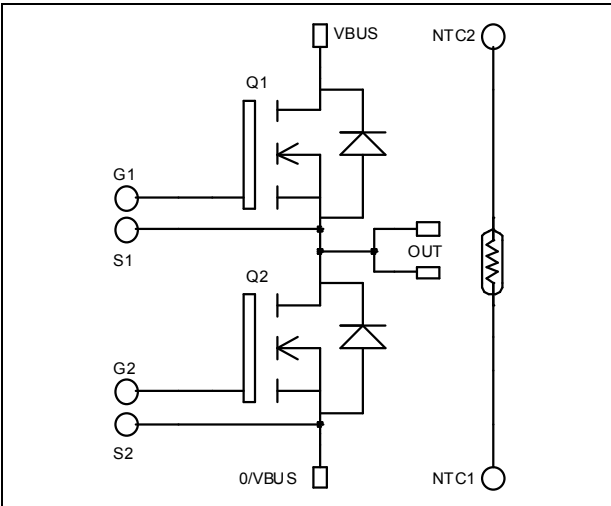
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Phase Leg MOSFET Power Module

$V_{DSS} = 1200V$
 $R_{DSon} = 290m\Omega \text{ typ @ } T_j = 25^\circ C$
 $I_D = 34A \text{ @ } T_c = 25^\circ C$

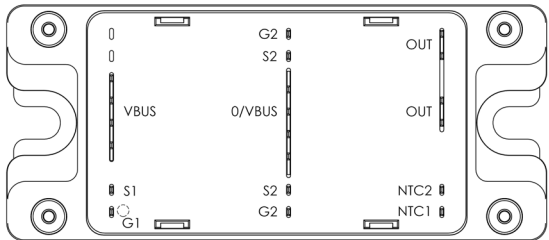


Application

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

Features

- Power MOS 7[®] 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
 - 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 | $T_c = 25^\circ C$ | 34 |
| | | $T_c = 80^\circ C$ | 25 |
| I_{DM} | Pulsed Drain current | 136 | |
| V_{GS} | Gate - Source Voltage | ± 30 | V |
| R_{DSon} | Drain - Source ON Resistance | 348 | $m\Omega$ |
| P_D | Maximum Power Dissipation | $T_c = 25^\circ C$ | 780 |
| 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

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 | μA |
| | | $V_{GS} = 0V, V_{DS} = 1000V$ | $T_j = 25^\circ\text{C}$ | | 1500 | |
| $R_{DS(on)}$ | Drain – Source on Resistance | $V_{GS} = 10V, I_D = 17A$ | | 290 | 348 | $\text{m}\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS} = V_{DS}, I_D = 5\text{mA}$ | 3 | | 5 | V |
| I_{GSS} | Gate – Source Leakage Current | $V_{GS} = \pm 30V, V_{DS} = 0V$ | | | ± 150 | nA |

Dynamic Characteristics

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

Source - Drain diode ratings and characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit | |
|----------|--|--|---------------------------|-----|-----|---------------|-------------|
| I_S | Continuous Source current (Body diode) | $T_c = 25^\circ\text{C}$ | | | 34 | A | |
| | | $T_c = 80^\circ\text{C}$ | | | 25 | | |
| V_{SD} | Diode Forward Voltage | $V_{GS} = 0V, I_S = -34A$ | | | 1.3 | V | |
| dv/dt | Peak Diode Recovery ① | | | | 18 | V/ns | |
| t_{rr} | Reverse Recovery Time | $I_S = -34A$ $V_R = 600V$ $di_s/dt = 200A/\mu\text{s}$ | $T_j = 25^\circ\text{C}$ | | | 320 | ns |
| | | | $T_j = 125^\circ\text{C}$ | | | 650 | |
| Q_{rr} | Reverse Recovery Charge | $I_S = -34A$ $V_R = 600V$ $di_s/dt = 200A/\mu\text{s}$ | $T_j = 25^\circ\text{C}$ | | 4 | μC | |
| | | | $T_j = 125^\circ\text{C}$ | | 14 | | |

 ① dv/dt numbers reflect the limitations of the circuit rather than the device itself.

 $I_S \leq -34A$ $di/dt \leq 700A/\mu\text{s}$ $V_R \leq V_{DSS}$ $T_j \leq 150^\circ\text{C}$

Thermal and package characteristics

| Symbol | Characteristic | Min | Typ | Max | Unit | |
|-------------------|--|-------------|-----|------|------|-----|
| R _{thJC} | Junction to Case Thermal Resistance | | | 0.16 | °C/W | |
| V _{ISOL} | RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz | 4000 | | | V | |
| T _J | Operating junction temperature range | -40 | | 150 | °C | |
| T _{STG} | Storage Temperature Range | -40 | | 125 | | |
| T _C | Operating Case Temperature | -40 | | 100 | | |
| Torque | Mounting torque | To Heatsink | M5 | 2.5 | 4.7 | N.m |
| Wt | Package Weight | | | 160 | | g |

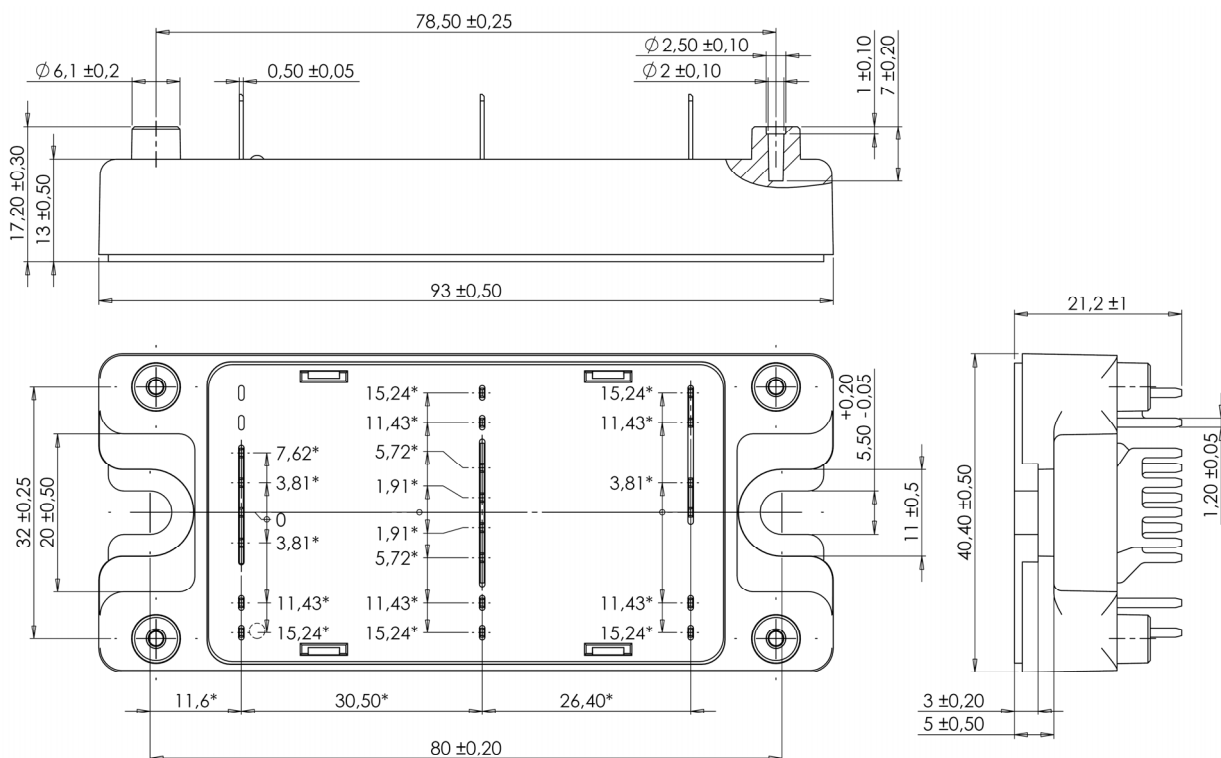
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

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

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

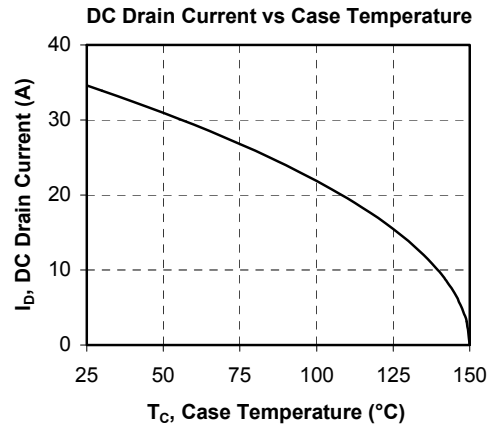
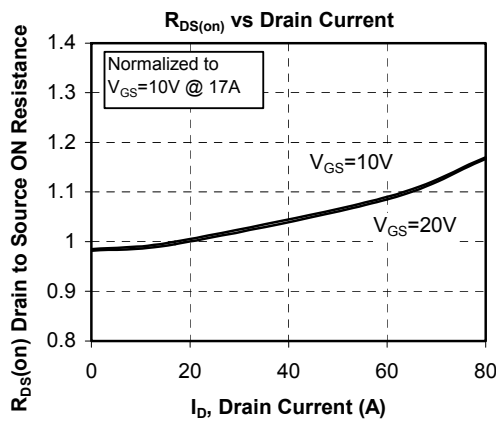
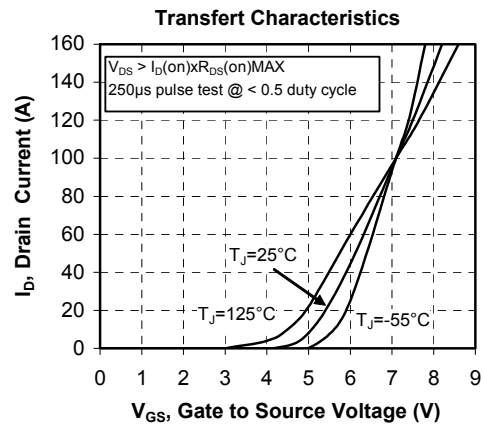
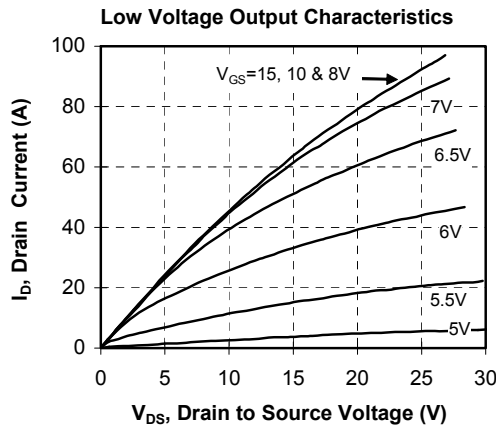
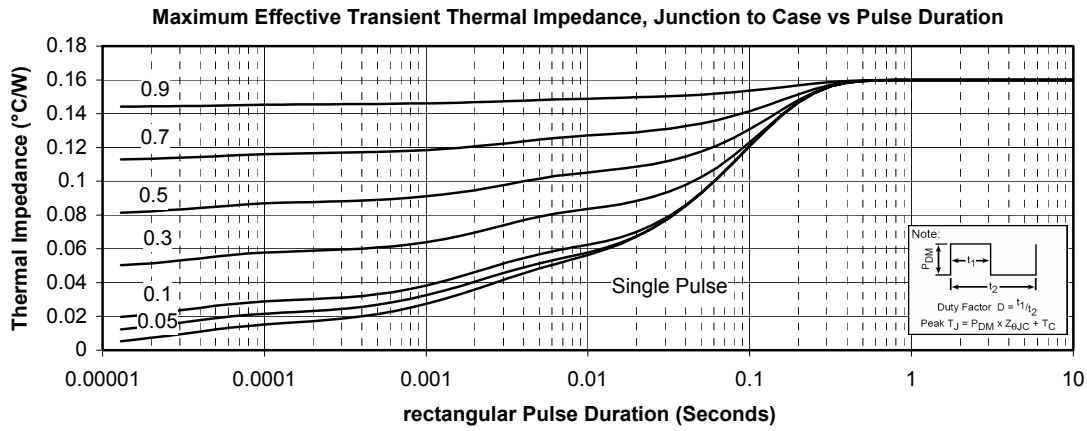
T: Thermistor temperature
R_T: Thermistor value at T

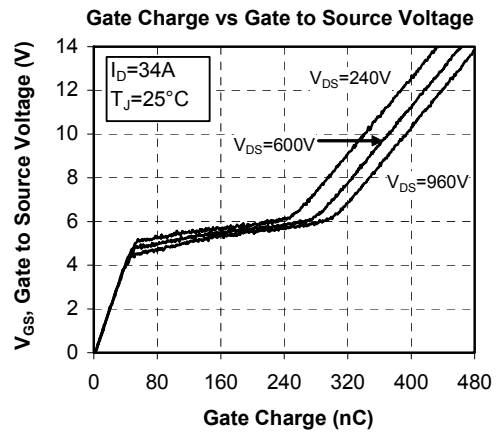
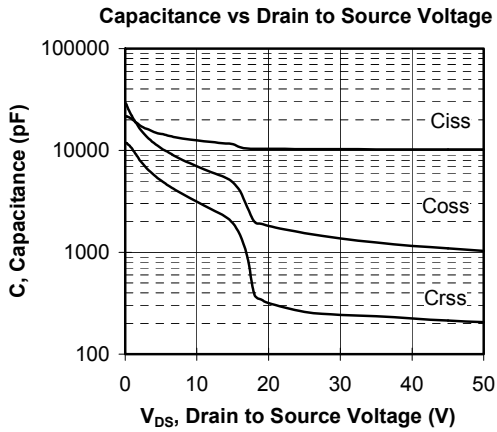
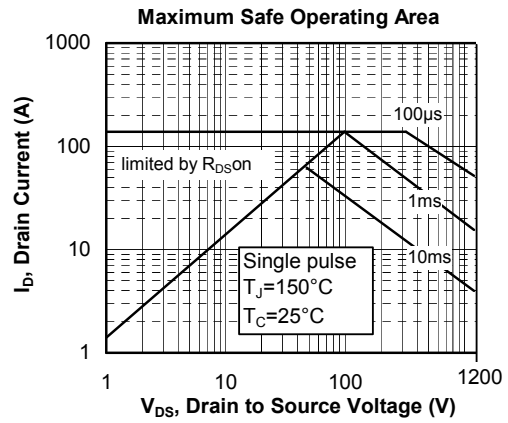
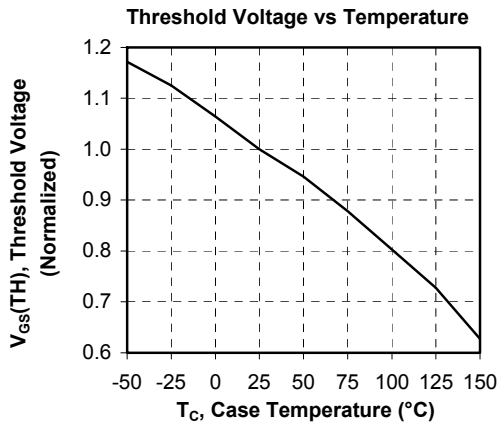
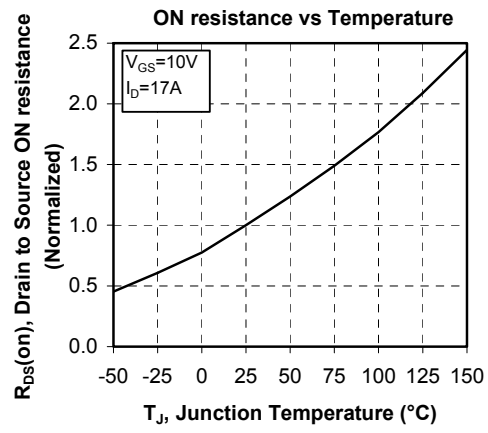
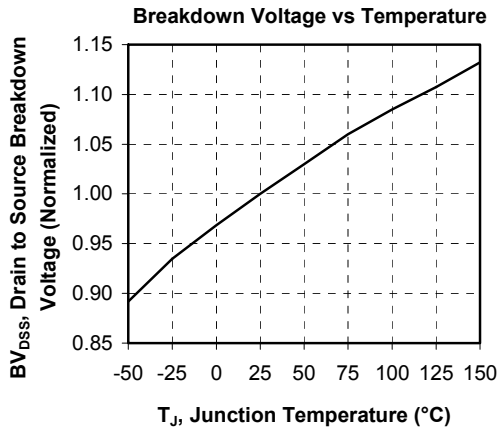
SP4 Package outline (dimensions in mm)

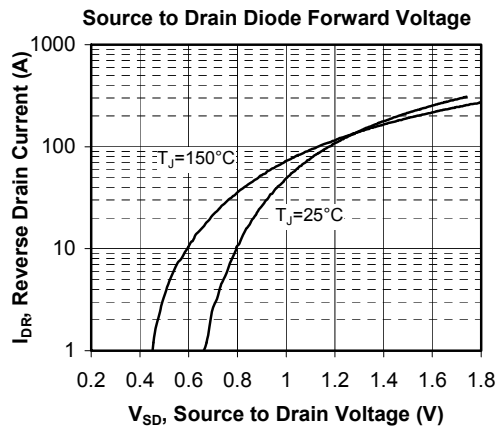
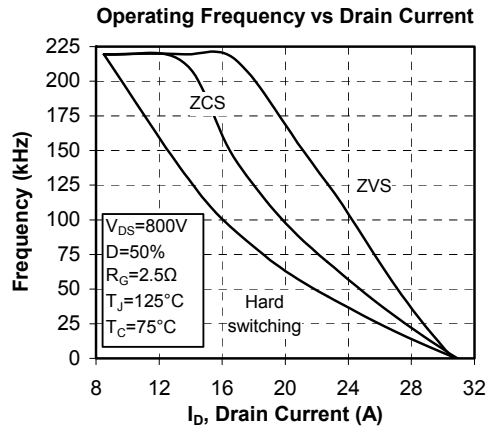
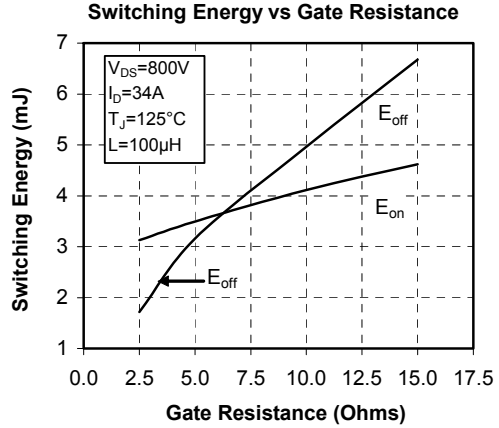
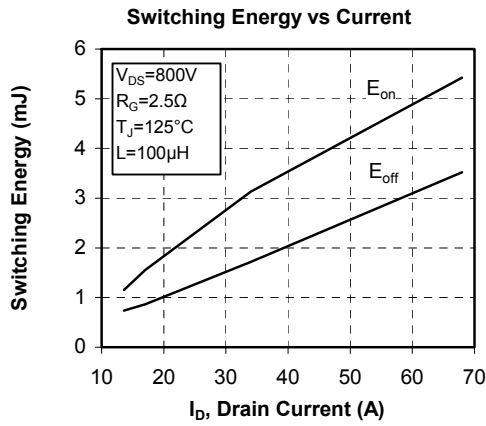
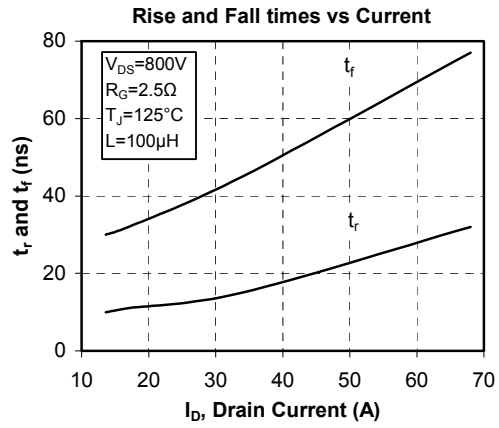
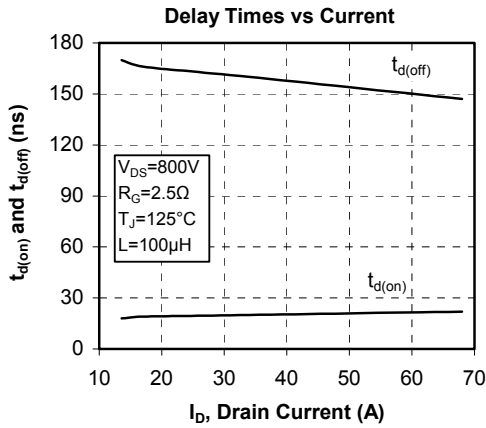


ALL DIMENSIONS MARKED "*" ARE TOLERANCED AS: $\pm \phi 1$

See application note APT0501 - Mounting Instructions for SP4 Power Modules on www.microsemi.com

Typical Performance Curve






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