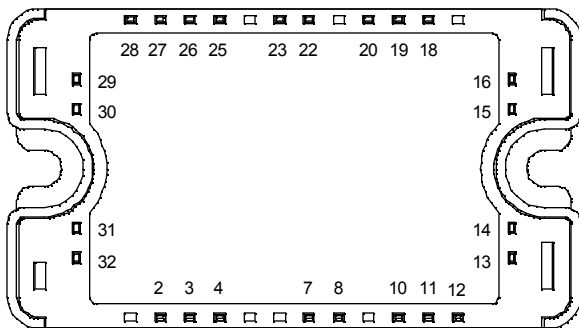
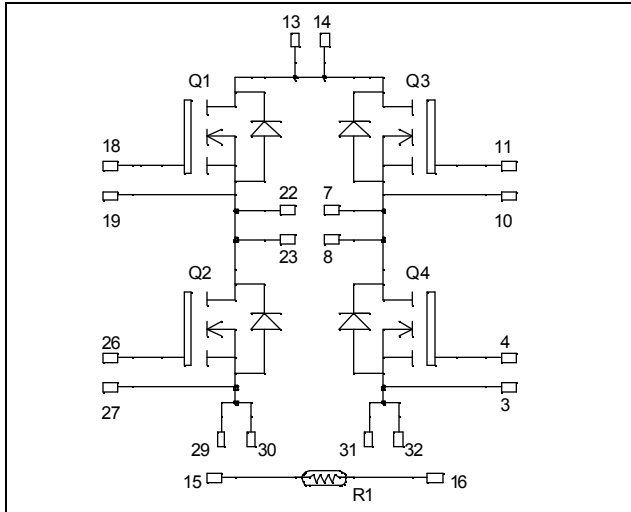


Full - Bridge Super Junction MOSFET Power Module

$V_{DSS} = 800V$
 $R_{DSon} = 150m\Omega \text{ max @ } T_j = 25^\circ C$
 $I_D = 28A \text{ @ } T_c = 25^\circ C$



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

- **COOLMOS** Power Semiconductors
 - Ultra low R_{DSon}
 - Low Miller capacitance
 - Ultra 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
- 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 | 800 | V |
| I_D | Continuous Drain Current | $T_c = 25^\circ C$ | 28 |
| | | $T_c = 80^\circ C$ | 21 |
| I_{DM} | Pulsed Drain current | 110 | |
| V_{GS} | Gate - Source Voltage | ± 30 | V |
| R_{DSon} | Drain - Source ON Resistance | 150 | $m\Omega$ |
| P_D | Maximum Power Dissipation | $T_c = 25^\circ C$ | 277 |
| I_{AR} | Avalanche current (repetitive and non repetitive) | 17 | A |
| E_{AR} | Repetitive Avalanche Energy | 0.5 | mJ |
| E_{AS} | Single Pulse Avalanche Energy | 670 | |

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 | $V_{GS} = 0\text{V}, V_{DS} = 800\text{V}$ | | | 50 | μA |
| | | $T_j = 25^\circ\text{C}$ | | | | |
| | | $V_{GS} = 0\text{V}, V_{DS} = 800\text{V}$ | | | 375 | |
| $R_{DS(on)}$ | Drain – Source on Resistance | $V_{GS} = 10\text{V}, I_D = 14\text{A}$ | | | 150 | $\text{m}\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS} = V_{DS}, I_D = 2\text{mA}$ | 2.1 | 3 | 3.9 | V |
| I_{GSS} | Gate – Source Leakage Current | $V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$ | | | ± 150 | nA |

Dynamic Characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|--------------|------------------------------|--|-----|------|-----|---------------|
| C_{iss} | Input Capacitance | $V_{GS} = 0\text{V}$ | | 4507 | | pF |
| C_{oss} | Output Capacitance | $V_{DS} = 25\text{V}$ | | 2092 | | |
| C_{rss} | Reverse Transfer Capacitance | $f = 1\text{MHz}$ | | 108 | | |
| Q_g | Total gate Charge | $V_{GS} = 10\text{V}$ | | 180 | | nC |
| Q_{gs} | Gate – Source Charge | $V_{Bus} = 400\text{V}$ | | 22 | | |
| Q_{gd} | Gate – Drain Charge | $I_D = 28\text{A}$ | | 90 | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive switching @125°C $V_{GS} = 15\text{V}$ $V_{Bus} = 533\text{V}$ $I_D = 28\text{A}$ $R_G = 2.5\Omega$ | | 10 | | ns |
| T_r | Rise Time | | | 13 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | 83 | | |
| T_f | Fall Time | | | 35 | | |
| E_{on} | Turn-on Switching Energy | Inductive switching @ 25°C $V_{GS} = 15\text{V}, V_{Bus} = 533\text{V}$ $I_D = 28\text{A}, R_G = 2.5\Omega$ | | 486 | | μJ |
| E_{off} | Turn-off Switching Energy | | | 278 | | |
| E_{on} | Turn-on Switching Energy | Inductive switching @ 125°C $V_{GS} = 15\text{V}, V_{Bus} = 533\text{V}$ $I_D = 28\text{A}, R_G = 2.5\Omega$ | | 850 | | μJ |
| E_{off} | Turn-off Switching Energy | | | 342 | | |

Source - Drain diode ratings and characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|----------|---|--|-----|-----|-----|------|
| I_S | Continuous Source current (Body diode) | $T_c = 25^\circ\text{C}$ | | 28 | | A |
| | | $T_c = 80^\circ\text{C}$ | | 21 | | |
| V_{SD} | Diode Forward Voltage | $V_{GS} = 0\text{V}, I_S = -28\text{A}$ | | | 1.2 | V |
| dv/dt | Peak Diode Recovery ❶ | | | | 6 | V/ns |
| t_{rr} | Reverse Recovery Time | $I_S = -28\text{A}$ $V_R = 400\text{V}$ | | 550 | | ns |
| Q_{rr} | Reverse Recovery Charge | $di_S/dt = 200\text{A}/\mu\text{s}$ | | 30 | | |

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

 $I_S \leq -28\text{A}$ $di/dt \leq 200\text{A}/\mu\text{s}$ $V_R \leq V_{DSS}$ $T_j \leq 150^\circ\text{C}$

Thermal and package characteristics

Symbol Characteristic

| Symbol | Characteristic | Min | Typ | Max | Unit | |
|-------------------|--|-------------|-----|------|------|-----|
| R _{thJC} | Junction to Case Thermal Resistance | | | 0.45 | °C/W | |
| V _{ISOL} | RMS Isolation Voltage, any terminal to case t=1 min, I _{isol} <1mA, 50/60Hz | 2500 | | | 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 | M4 | 2.5 | 4.7 | N.m |
| Wt | Package Weight | | | | 110 | g |

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

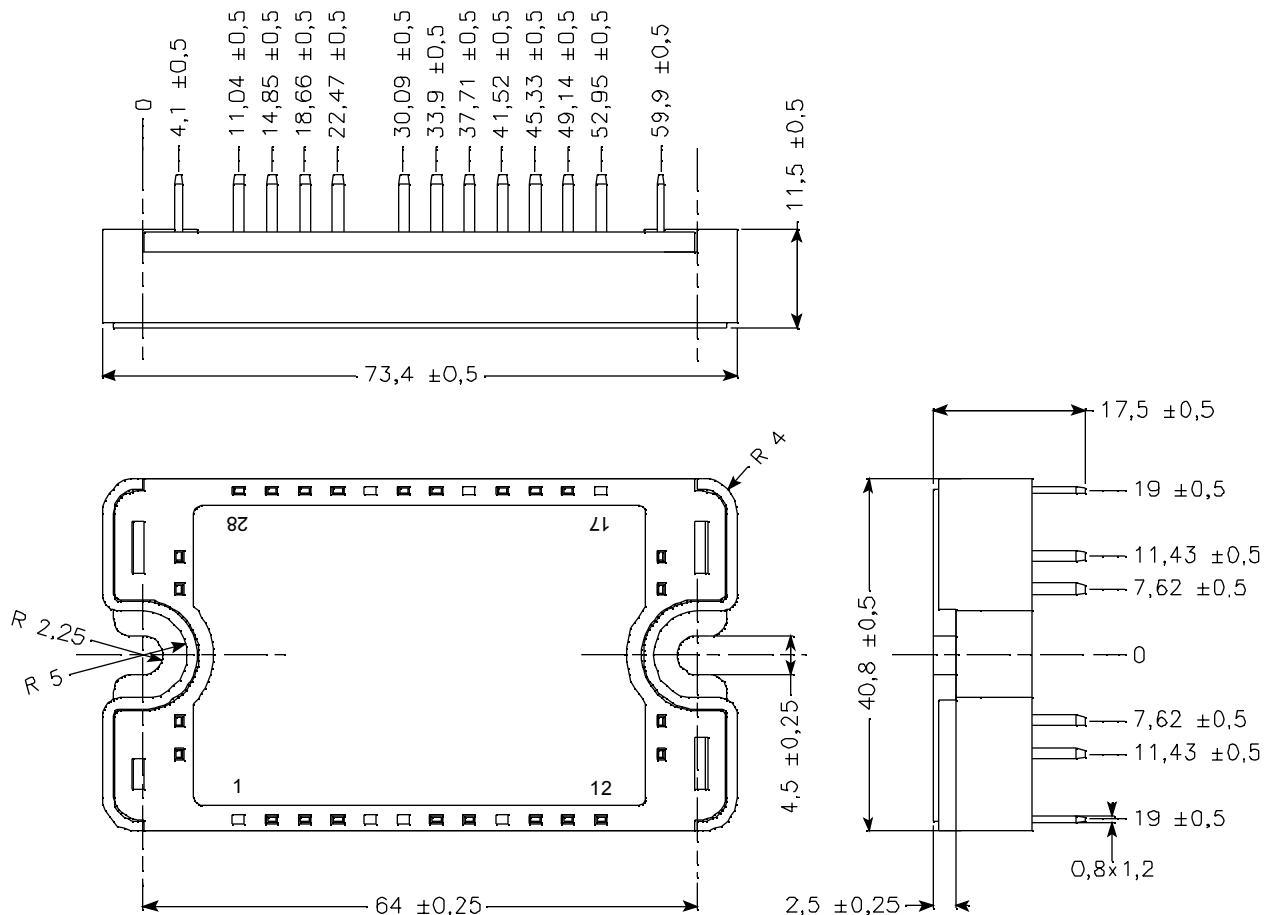
Symbol Characteristic

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

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

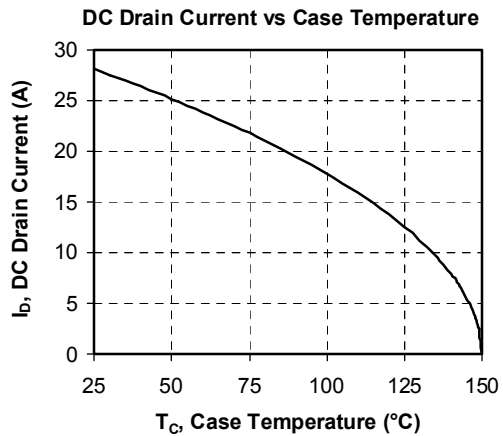
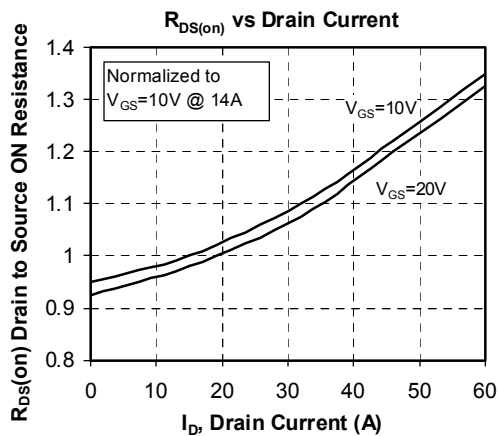
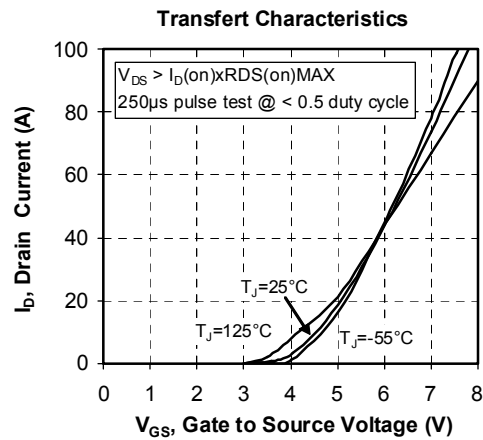
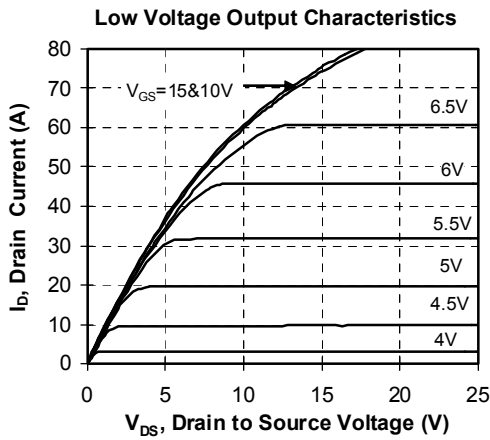
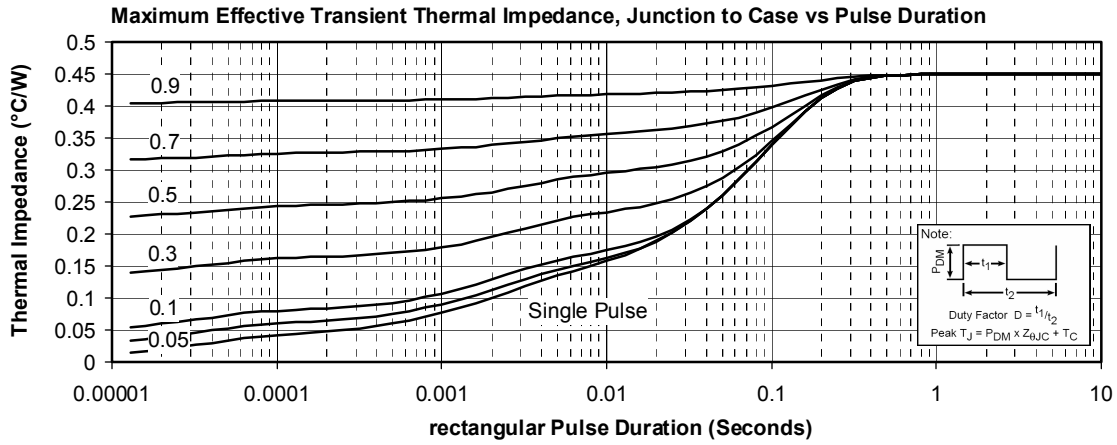
T: Thermistor temperature
 R_T: Thermistor value at T

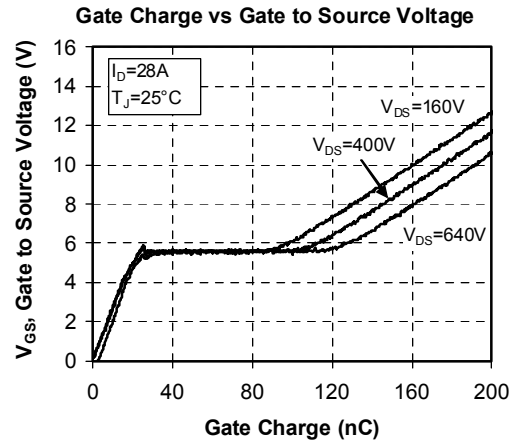
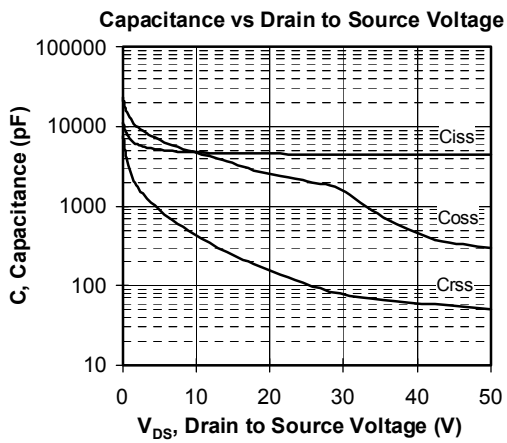
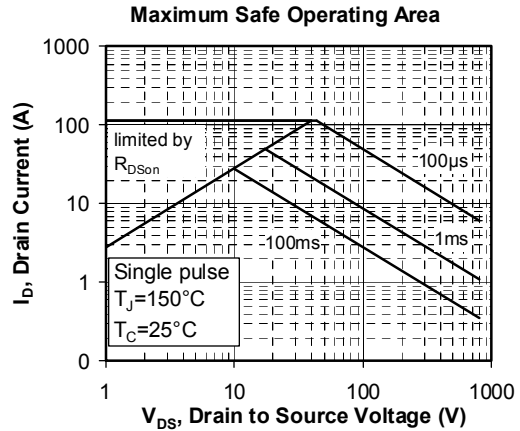
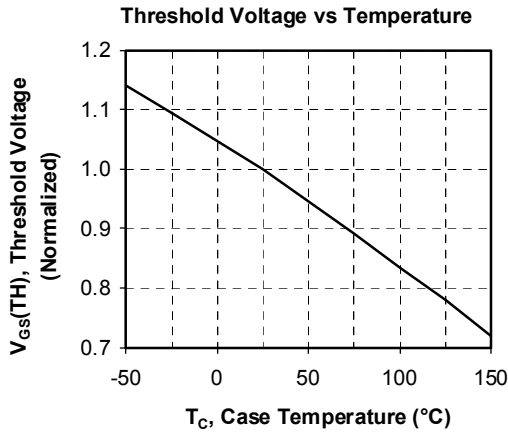
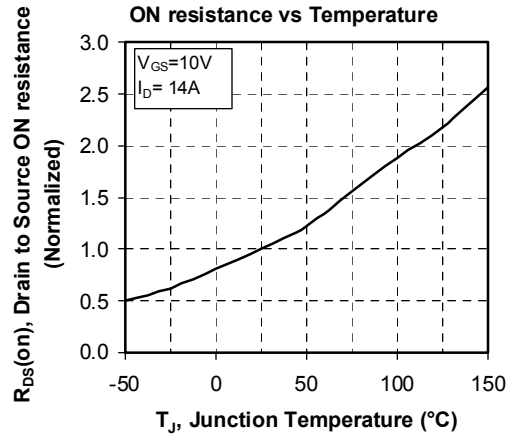
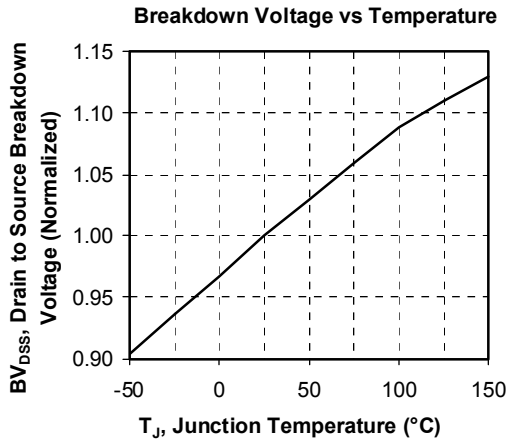
SP3 Package outline (dimensions in mm)

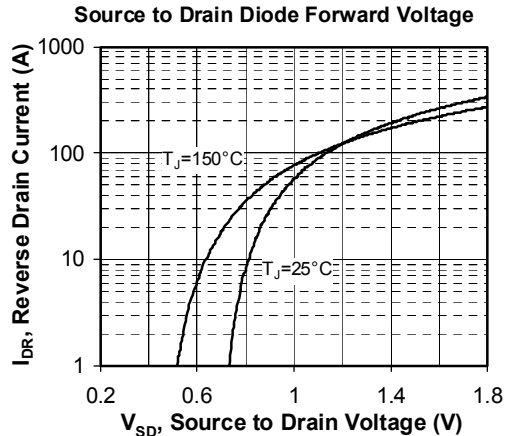
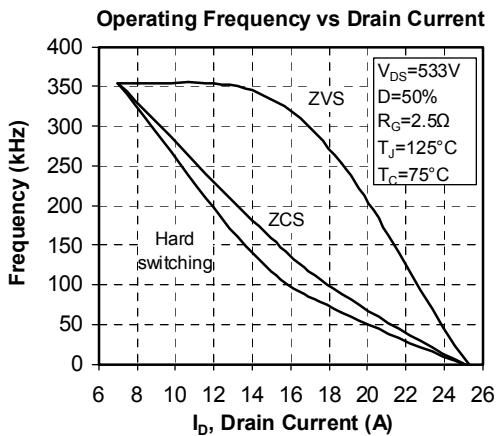
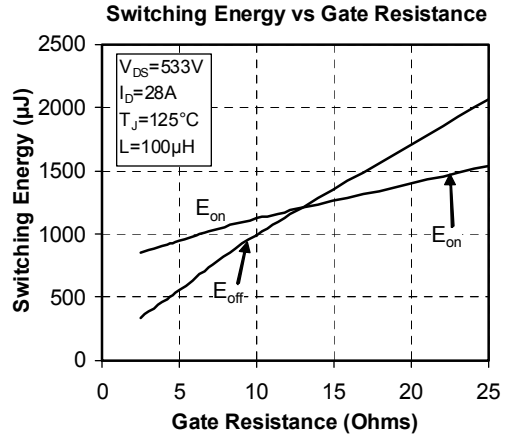
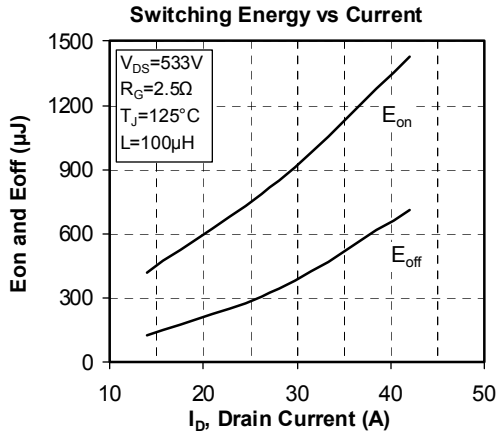
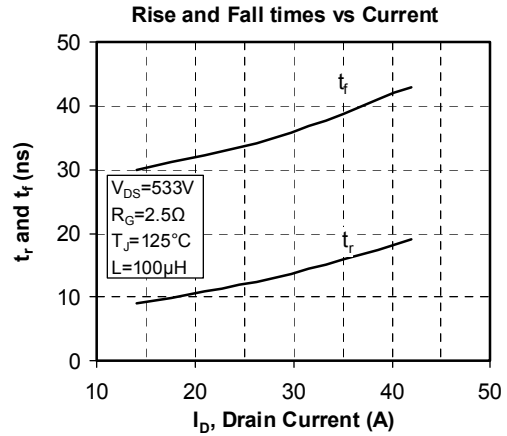
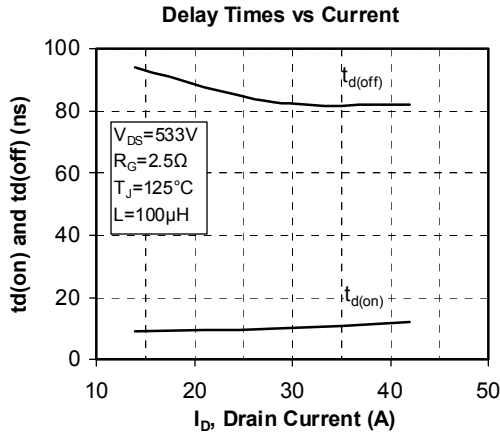


See application note 1901 - Mounting Instructions for SP3 Power Modules on www.microsemi.com

Typical Performance Curve







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