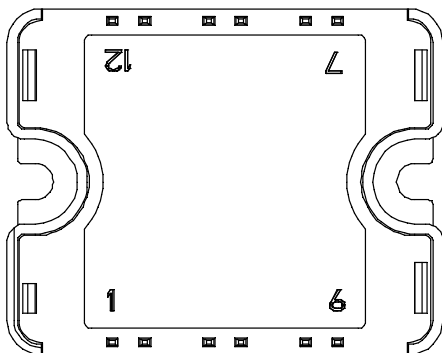
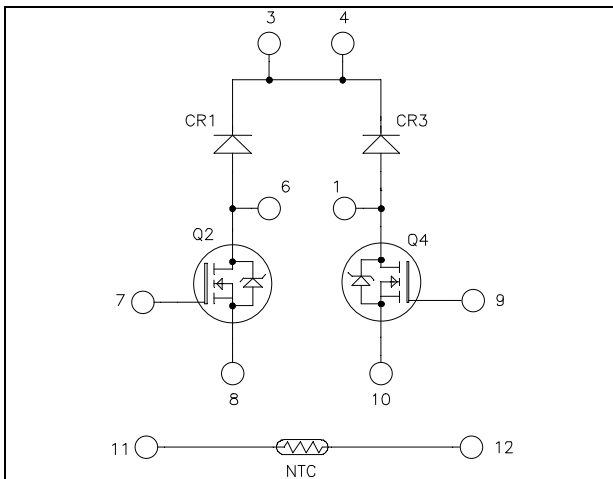


**Dual boost chopper
Super Junction MOSFET
Power Module**

$V_{DSS} = 600V$
 $R_{DSon} = 70m\Omega \text{ max @ } T_j = 25^\circ C$
 $I_D = 39A \text{ @ } T_c = 25^\circ C$



Pins 3/4 must be shorted together

Application

- AC and DC motor control
- Switched Mode Power Supplies
- Power Factor Correction

Features



- Ultra low R_{DSon}
 - Low Miller capacitance
 - Ultra low gate charge
 - Avalanche energy rated
 - Very rugged
 - 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
 - Each leg can be easily paralleled to achieve a single boost of twice the current capability
 - Low profile
 - RoHS Compliant

Absolute maximum ratings

| Symbol | Parameter | Max ratings | Unit |
|------------|---|--------------------|-----------|
| V_{DSS} | Drain - Source Breakdown Voltage | 600 | V |
| I_D | Continuous Drain Current | $T_c = 25^\circ C$ | 39 |
| | | $T_c = 80^\circ C$ | 29 |
| I_{DM} | Pulsed Drain current | 160 | |
| V_{GS} | Gate - Source Voltage | ± 20 | V |
| R_{DSon} | Drain - Source ON Resistance | 70 | $m\Omega$ |
| P_D | Maximum Power Dissipation | $T_c = 25^\circ C$ | 250 |
| I_{AR} | Avalanche current (repetitive and non repetitive) | 20 | A |
| E_{AR} | Repetitive Avalanche Energy | 1 | mJ |
| E_{AS} | Single Pulse Avalanche Energy | 1800 | |

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 | $V_{GS} = 0V, V_{DS} = 600V$ | | | 25 | μA |
| | | $T_j = 25^\circ\text{C}$ | | | | |
| | | $V_{GS} = 0V, V_{DS} = 600V$ | | | 250 | |
| $R_{DS(on)}$ | Drain – Source on Resistance | $V_{GS} = 10V, I_D = 39A$ | | | 70 | $\text{m}\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS} = V_{DS}, I_D = 2.7\text{mA}$ | 2.1 | 3 | 3.9 | V |
| I_{GSS} | Gate – Source Leakage Current | $V_{GS} = \pm 20V, V_{DS} = 0V$ | | | ± 100 | nA |

Dynamic Characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|--------------|------------------------------|--|-----|------|-----|---------------|
| C_{iss} | Input Capacitance | $V_{GS} = 0V$ | | 7 | | nF |
| C_{oss} | Output Capacitance | $V_{DS} = 25V$ | | 2.56 | | |
| C_{rss} | Reverse Transfer Capacitance | $f = 1\text{MHz}$ | | 0.21 | | |
| Q_g | Total gate Charge | $V_{GS} = 10V$ | | 259 | | nC |
| Q_{gs} | Gate – Source Charge | $V_{Bus} = 300V$ | | 29 | | |
| Q_{gd} | Gate – Drain Charge | $I_D = 39A$ | | 111 | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching @ 125°C $V_{GS} = 15V$ $V_{Bus} = 400V$ $I_D = 39A$ $R_G = 5\Omega$ | | 21 | | ns |
| T_r | Rise Time | | | 30 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | 283 | | |
| T_f | Fall Time | | | 84 | | |
| E_{on} | Turn-on Switching Energy | Inductive switching @ 25°C $V_{GS} = 15V, V_{Bus} = 400V$ $I_D = 39A, R_G = 5\Omega$ | | 670 | | μJ |
| E_{off} | Turn-off Switching Energy | | | 980 | | |
| E_{on} | Turn-on Switching Energy | Inductive switching @ 125°C $V_{GS} = 15V, V_{Bus} = 400V$ $I_D = 39A, R_G = 5\Omega$ | | 1096 | | μJ |
| E_{off} | Turn-off Switching Energy | | | 1206 | | |

Chopper diode ratings and characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|-----------|---|---|---------------------------|-----|-----|---------------|
| V_{RRM} | Maximum Peak Repetitive Reverse Voltage | | 600 | | | V |
| I_{RM} | Maximum Reverse Leakage Current | $V_R = 600V$ | | | 25 | μA |
| | | $T_j = 25^\circ\text{C}$ | | | 500 | |
| | | $T_j = 125^\circ\text{C}$ | | | | |
| I_F | DC Forward Current | $T_c = 80^\circ\text{C}$ | | 30 | | A |
| V_F | Diode Forward Voltage | $I_F = 30A$ | | 1.8 | 2.2 | V |
| | | $I_F = 60A$ | | 2.2 | | |
| | | $I_F = 30A$ | $T_j = 125^\circ\text{C}$ | | 1.5 | |
| t_{rr} | Reverse Recovery Time | $I_F = 30A$ $V_R = 400V$ $di/dt = 200A/\mu\text{s}$ | $T_j = 25^\circ\text{C}$ | | 25 | ns |
| | | | $T_j = 125^\circ\text{C}$ | | 160 | |
| Q_{rr} | Reverse Recovery Charge | | $T_j = 25^\circ\text{C}$ | | 35 | nC |
| | | | $T_j = 125^\circ\text{C}$ | | 480 | |

Thermal and package characteristics

| Symbol | Characteristic | Min | Typ | Max | Unit | |
|-------------------|--|-------------|-----|-----|------|-----|
| R _{thJC} | Junction to Case Thermal Resistance | CoolMOS | | 0.5 | °C/W | |
| | | Diode | | 1.2 | | |
| 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 | M4 | 2 | 3 | N.m |
| Wt | Package Weight | | | | 80 | g |

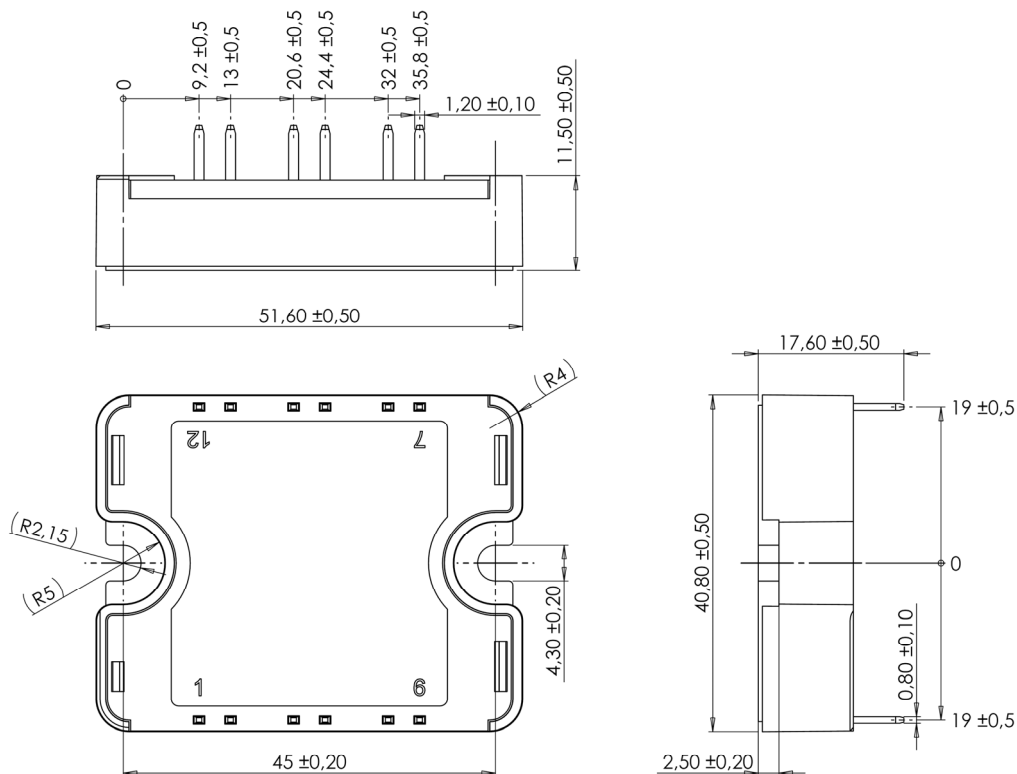
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

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

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

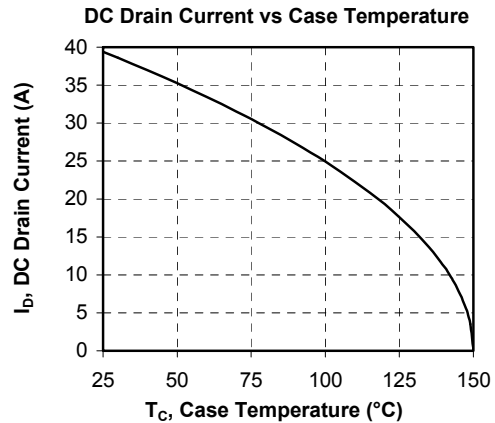
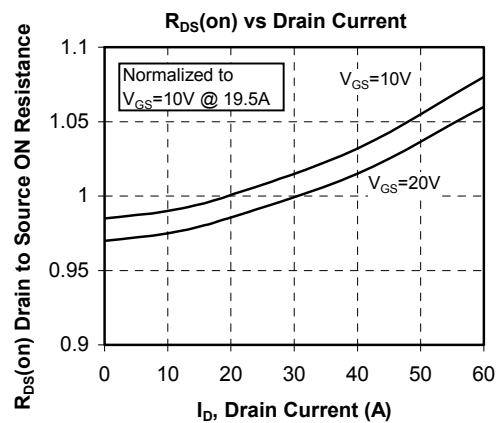
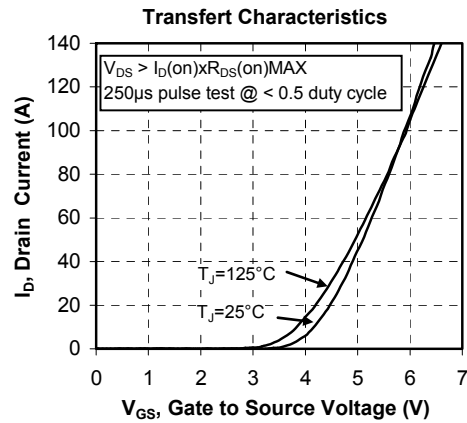
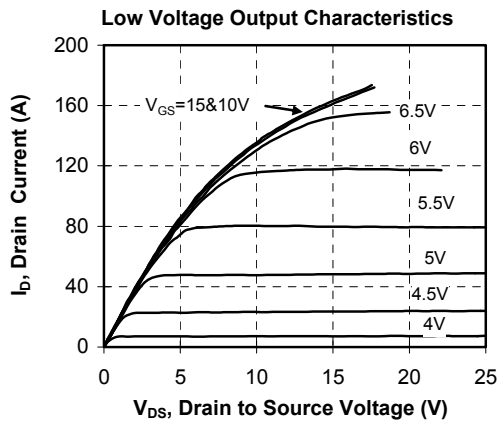
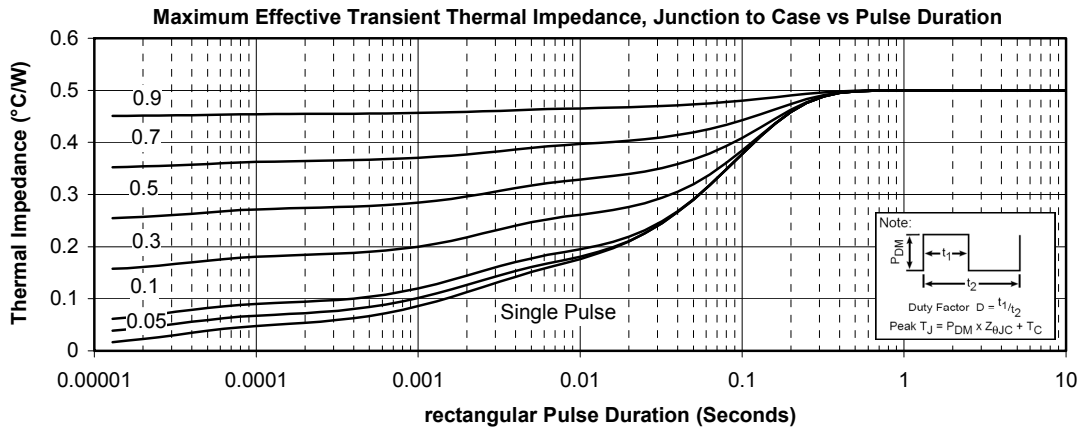
T: Thermistor temperature
 R_T: Thermistor value at T

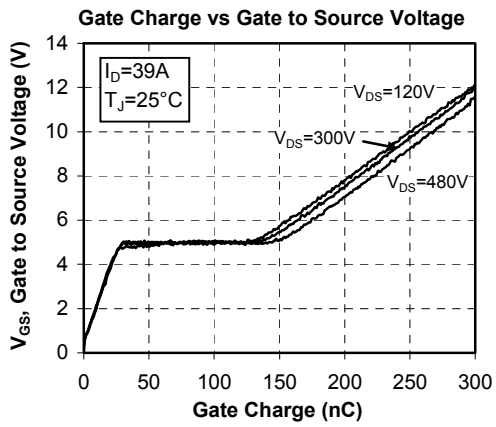
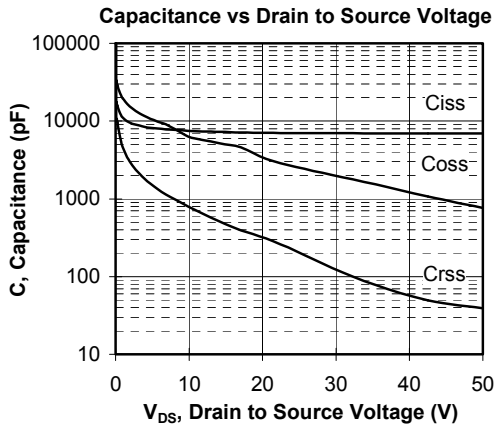
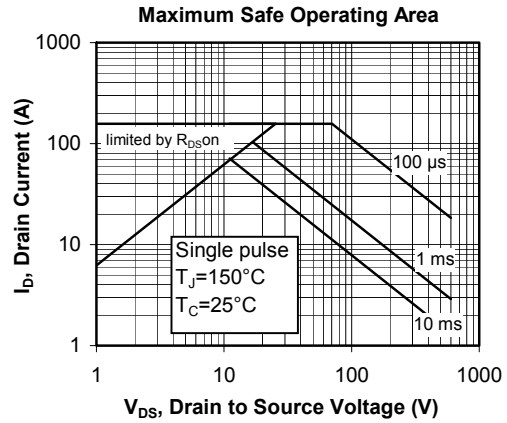
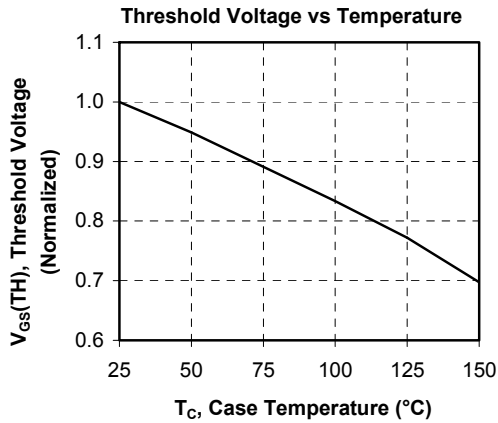
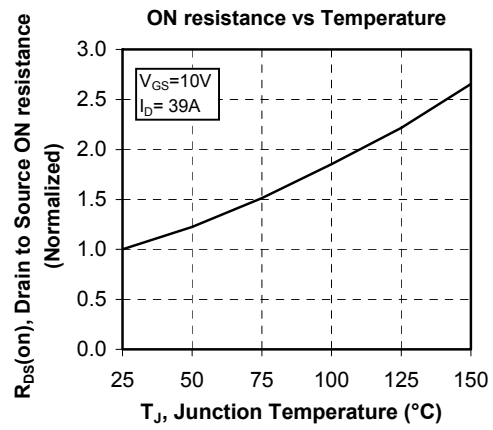
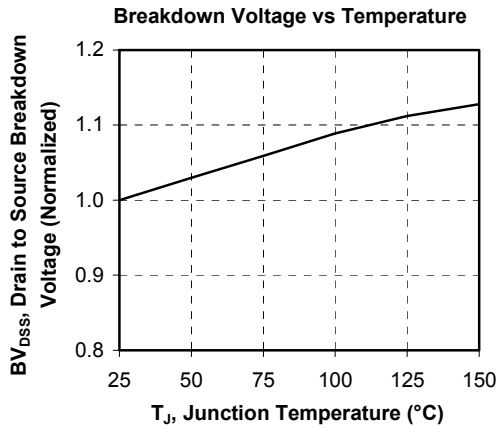
SP1 Package outline (dimensions in mm)

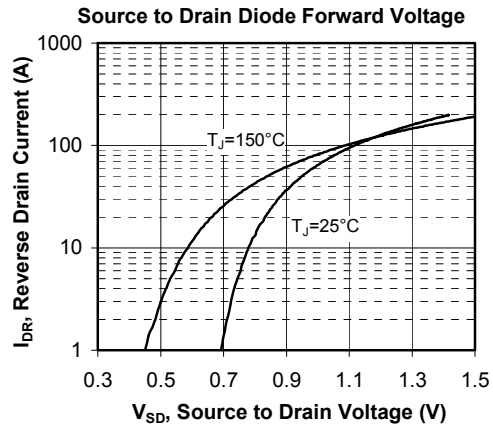
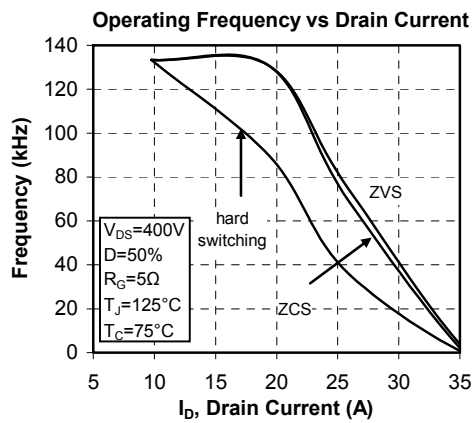
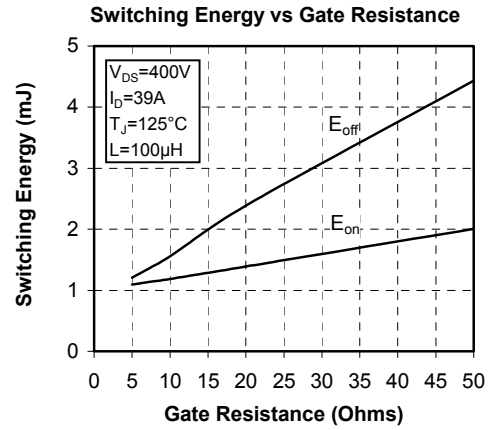
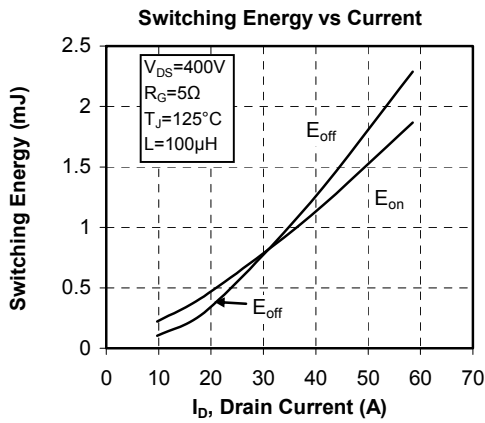
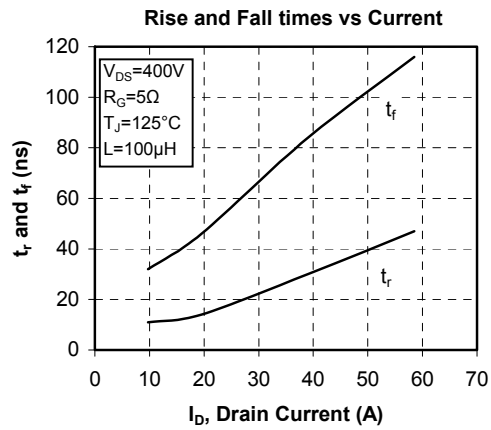
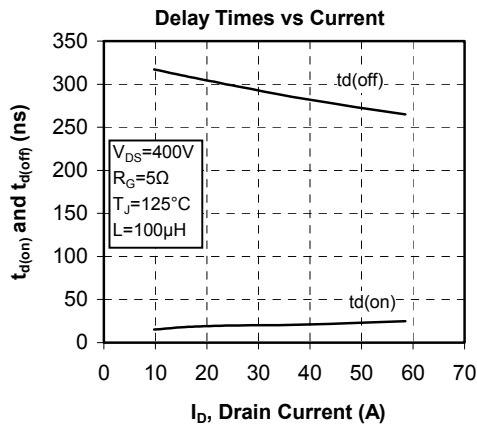


See application note 1904 - Mounting Instructions for SP1 Power Modules on www.microsemi.com

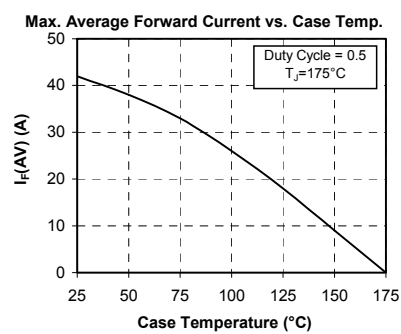
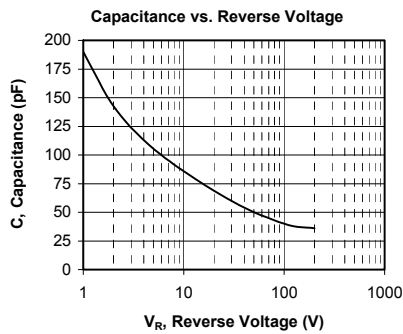
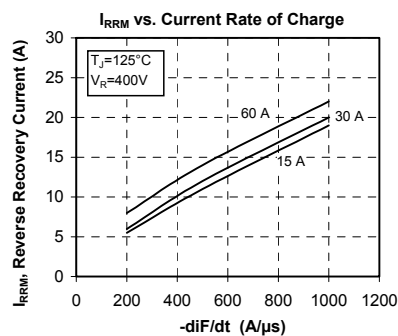
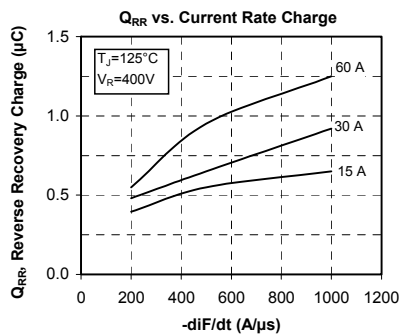
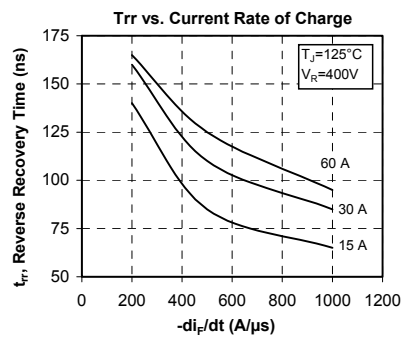
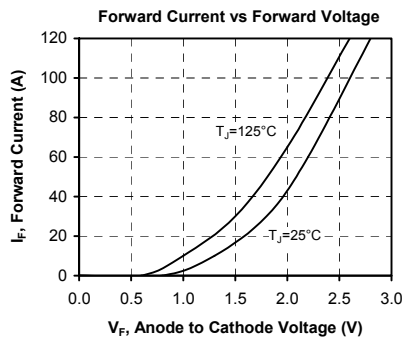
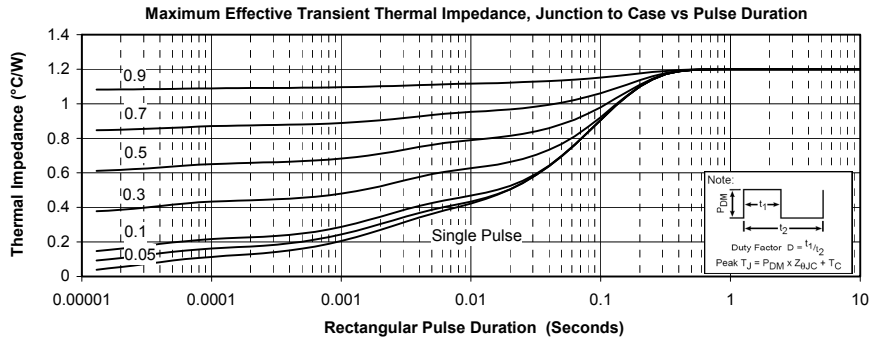
Typical CoolMOS Performance Curve







Typical chopper diode Performance Curve



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