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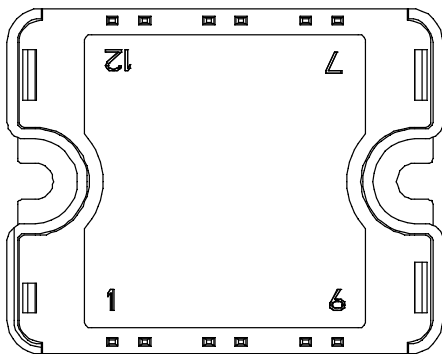
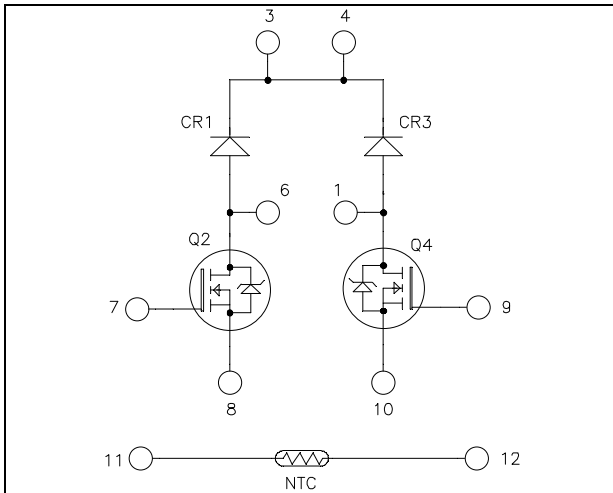
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**Dual boost chopper
Super Junction MOSFET
Power Module**

$V_{DSS} = 600V$
 $R_{DSon} = 45m\Omega \text{ max @ } T_j = 25^\circ C$
 $I_D = 49A \text{ @ } T_c = 25^\circ C$



Pins 3/4 must be shorted together

Application

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

Features

- **COOLMOS**
Power Semiconductors

- 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 | $T_c = 25^\circ C$ | 49 |
| | | $T_c = 80^\circ C$ | 38 |
| I_{DM} | Pulsed Drain current | 130 | A |
| V_{GS} | Gate - Source Voltage | ± 20 | V |
| R_{DSon} | Drain - Source ON Resistance | 45 | $m\Omega$ |
| P_D | Maximum Power Dissipation | $T_c = 25^\circ C$ | 250 |
| I_{AR} | Avalanche current (repetitive and non repetitive) | 15 | A |
| E_{AR} | Repetitive Avalanche Energy | 3 | mJ |
| E_{AS} | Single Pulse Avalanche Energy | 1900 | |

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 | | | 250 | μA |
| | | T _j = 25°C | | | | |
| | | V _{GS} = 0V, V _{DS} = 600V | | | 500 | |
| R _{DS(on)} | Drain – Source on Resistance | V _{GS} = 10V, I _D = 24.5A | | 40 | 45 | mΩ |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} = V _{DS} , I _D = 3mA | 2.1 | 3 | 3.9 | V |
| I _{GSS} | Gate – Source Leakage Current | V _{GS} = ±20 V, V _{DS} = 0V | | | 100 | nA |

Dynamic Characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|---------------------|---------------------------|---|-----|------|-----|------|
| C _{iss} | Input Capacitance | V _{GS} = 0V ; V _{DS} = 25V f = 1MHz | | 7.2 | | nF |
| C _{oss} | Output Capacitance | | | 8.5 | | |
| Q _g | Total gate Charge | V _{GS} = 10V V _{Bus} = 300V I _D = 49A | | 150 | | nC |
| Q _{gs} | Gate – Source Charge | | | 34 | | |
| Q _{gd} | Gate – Drain Charge | | | 51 | | |
| T _{d(on)} | Turn-on Delay Time | Inductive Switching (125°C) V _{GS} = 10V V _{Bus} = 400V I _D = 49A R _G = 5Ω | | 21 | | ns |
| T _r | Rise Time | | | 30 | | |
| T _{d(off)} | Turn-off Delay Time | | | 100 | | |
| T _f | Fall Time | | | 45 | | |
| E _{on} | Turn-on Switching Energy | Inductive switching @ 25°C V _{GS} = 10V ; V _{Bus} = 400V I _D = 49A ; R _G = 5Ω | | 675 | | μJ |
| E _{off} | Turn-off Switching Energy | | | 520 | | |
| E _{on} | Turn-on Switching Energy | Inductive switching @ 125°C V _{GS} = 10V ; V _{Bus} = 400V I _D = 49A ; R _G = 5Ω | | 1100 | | μJ |
| E _{off} | Turn-off Switching Energy | | | 635 | | |

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 | T _j = 25°C | | 25 | μA |
| | | | T _j = 125°C | | 500 | |
| I _F | DC Forward Current | | | 60 | | A |
| V _F | Diode Forward Voltage | I _F = 60A | | 1.7 | 2.3 | V |
| | | I _F = 120A | | 2 | | |
| | | I _F = 60A | T _j = 125°C | | 1.4 | |
| t _{rr} | Reverse Recovery Time | I _F = 60A V _R = 400V | T _j = 25°C | | 70 | ns |
| | | | T _j = 125°C | | 140 | |
| Q _{rr} | Reverse Recovery Charge | di/dt = 200A/μs | T _j = 25°C | | 100 | nC |
| | | | T _j = 125°C | | 690 | |

Thermal and package characteristics

| Symbol | Characteristic | Min | Typ | Max | Unit | |
|-------------------|--|-------------|-----|------|------|-----|
| R _{thJC} | Junction to Case Thermal Resistance | CoolMOS | | 0.5 | °C/W | |
| | | Diode | | 0.85 | | |
| 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 |

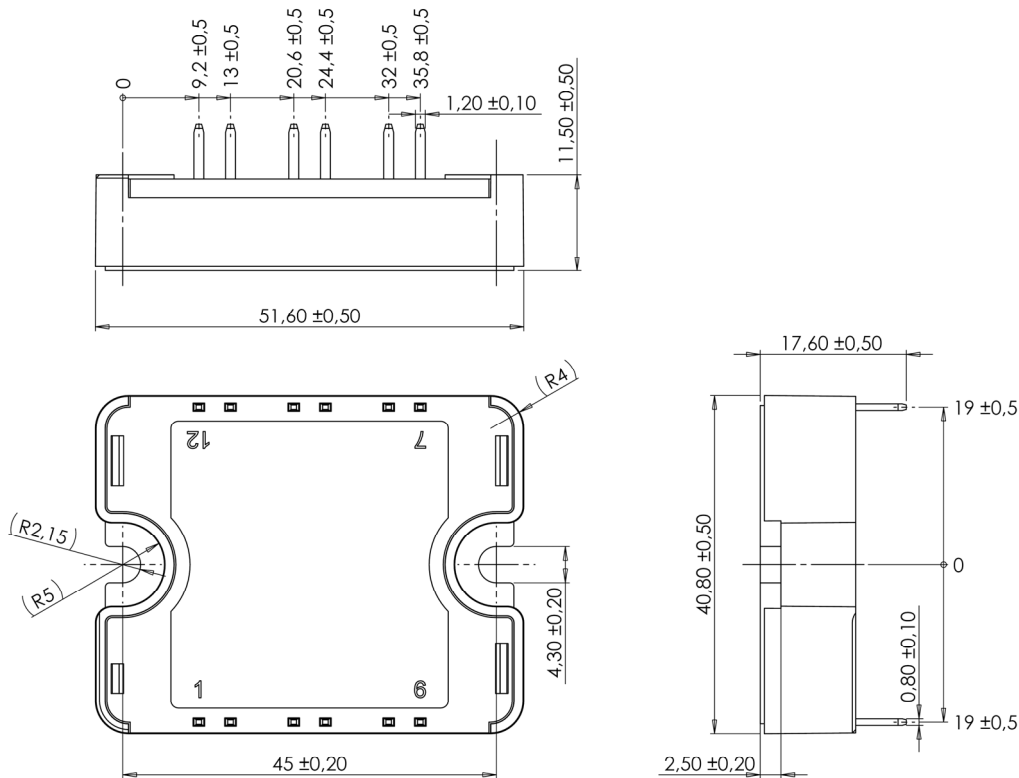
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

| 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 | | % |

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

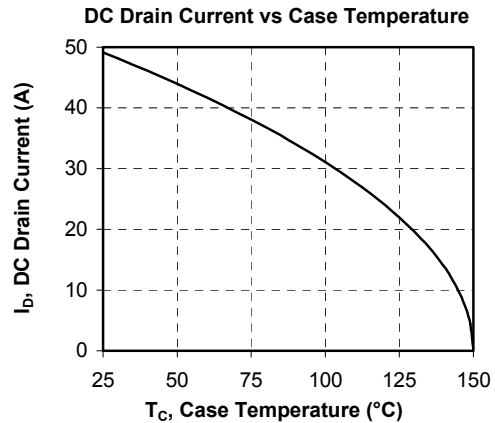
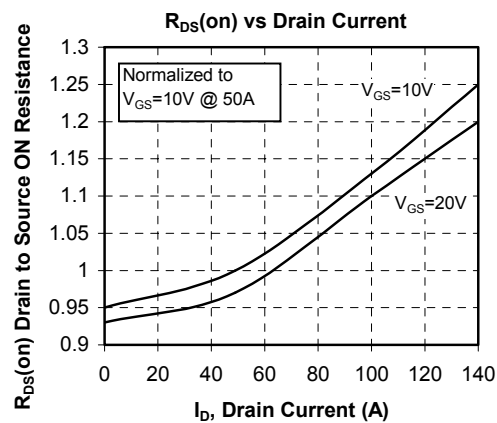
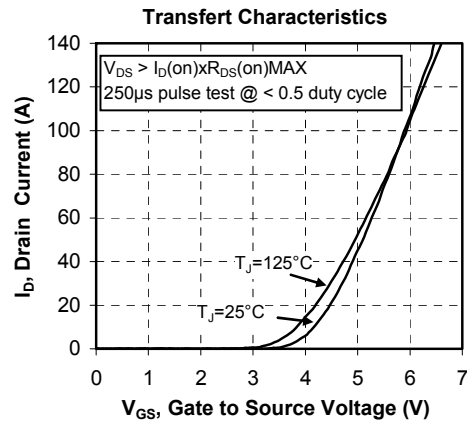
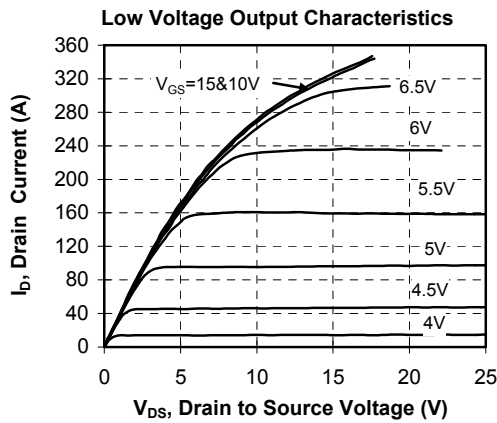
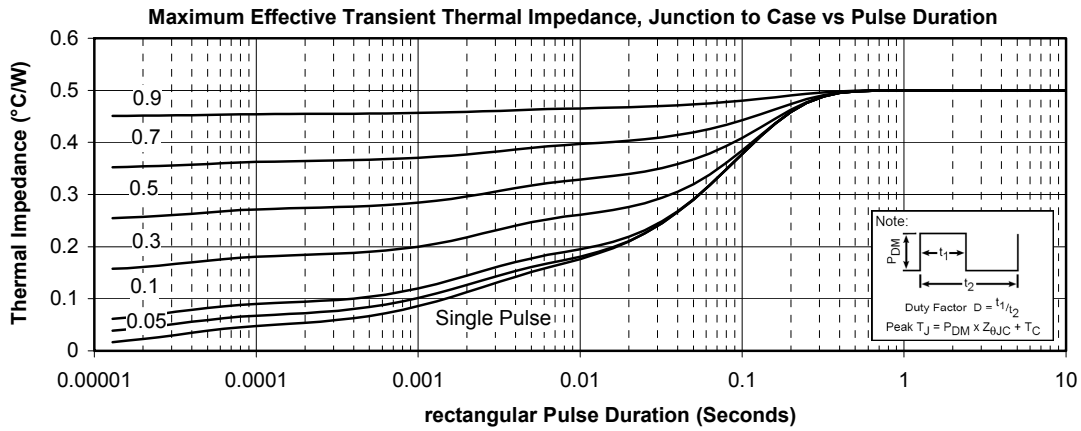
T: Thermistor temperature
 R_T: Thermistor value at T

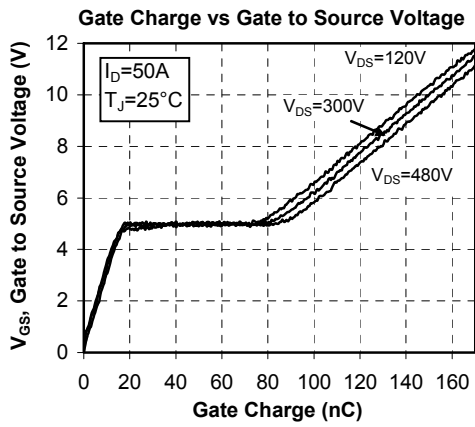
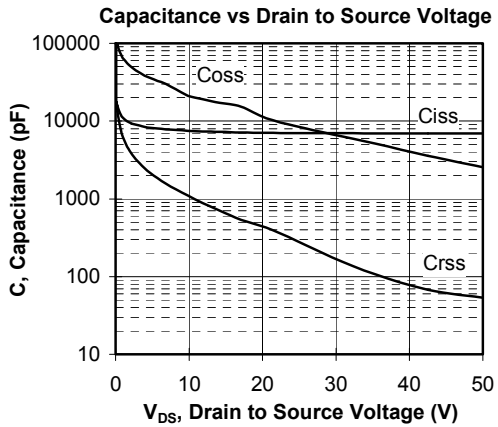
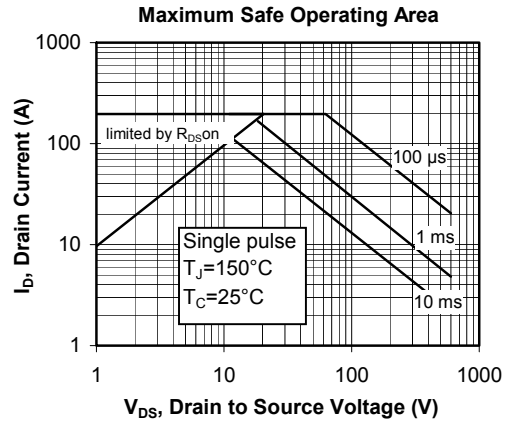
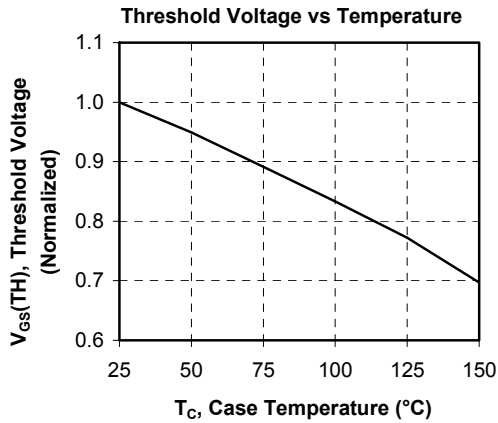
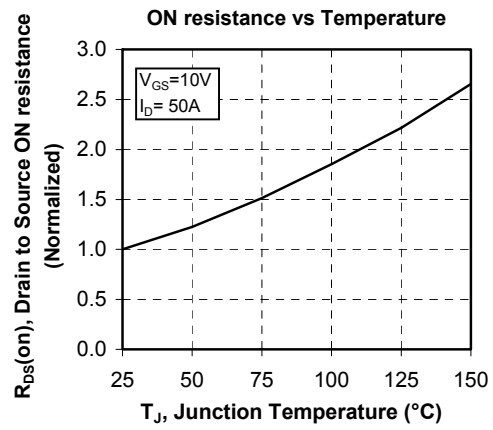
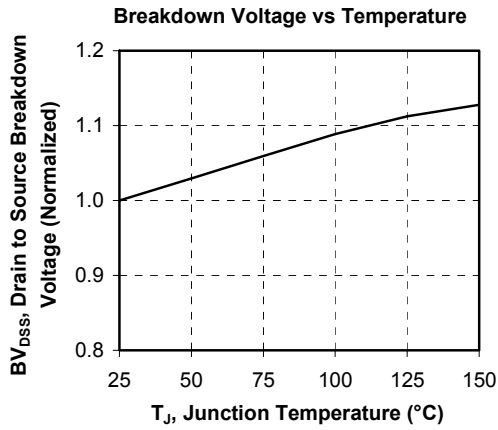
SP1 Package outline (dimensions in mm)

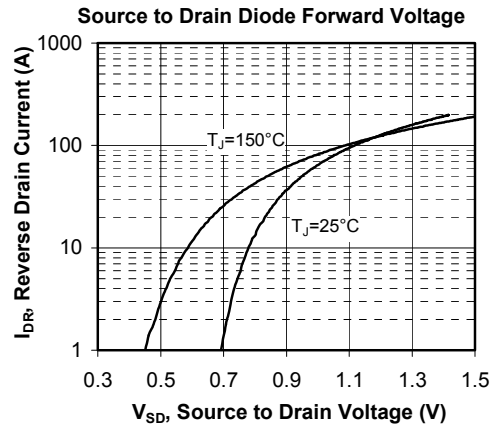
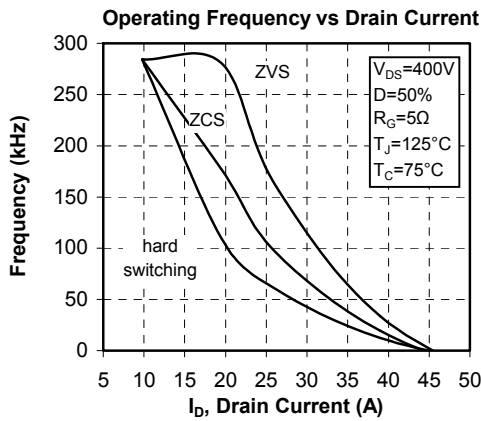
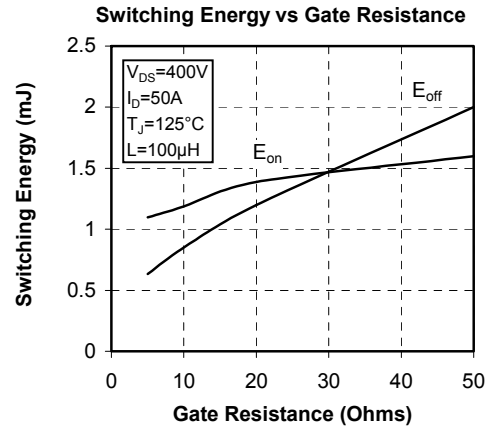
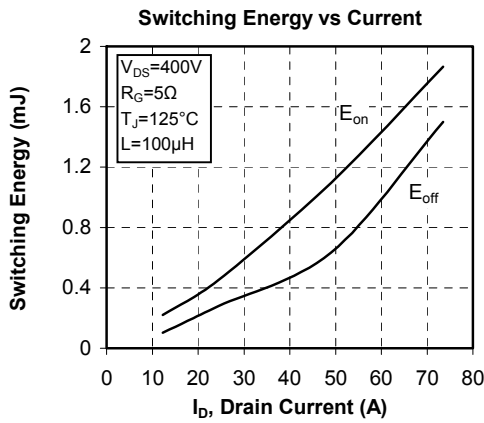
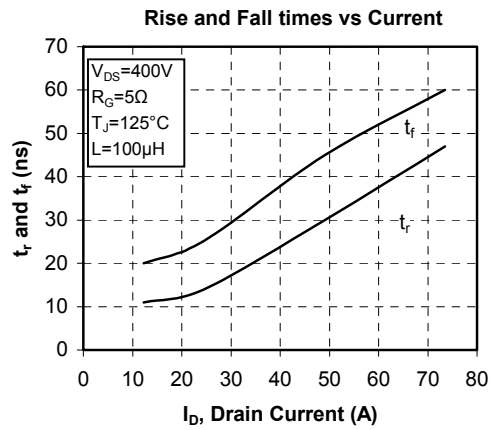
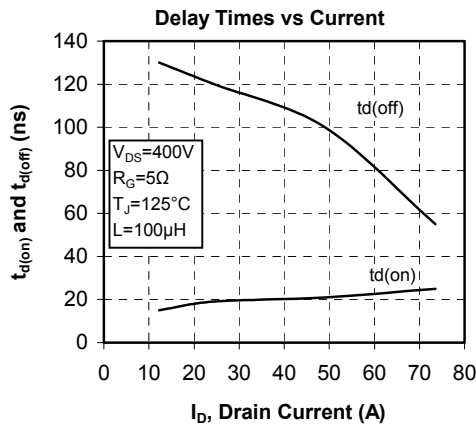


See application note 1904 - Mounting Instructions for SP1 Power Modules on www.microsemi.com

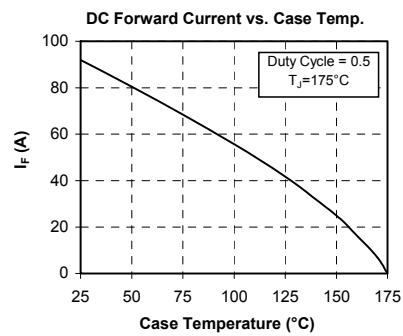
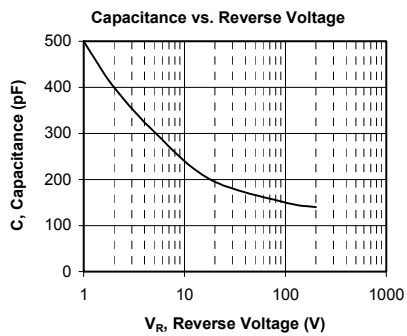
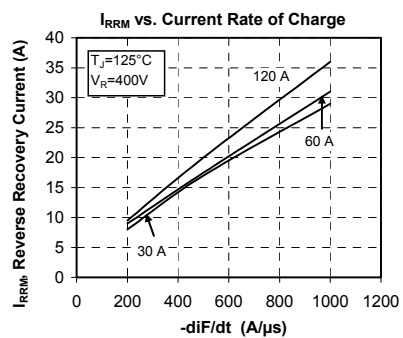
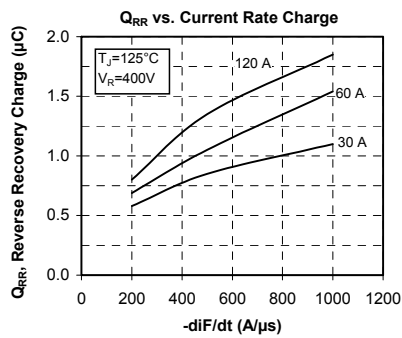
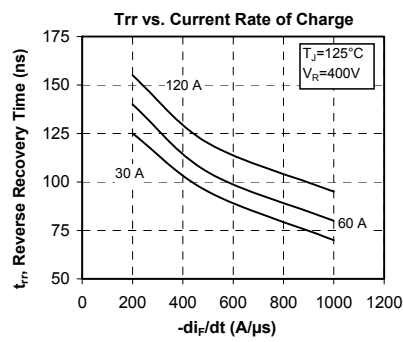
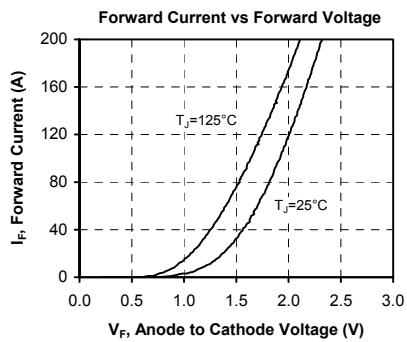
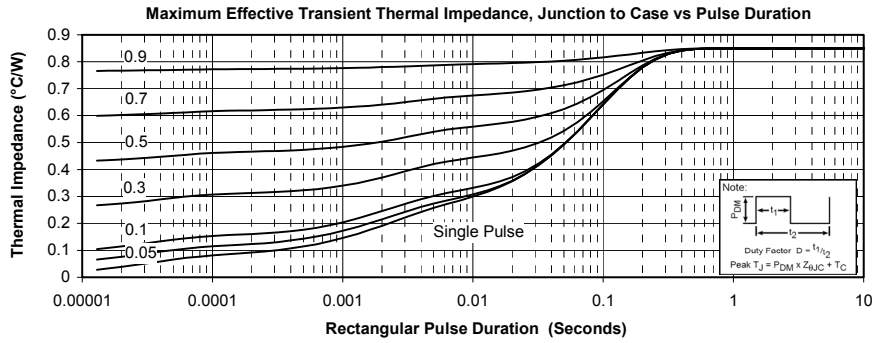
Typical CoolMOS Performance Curve







Typical chopper diode Performance Curve



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