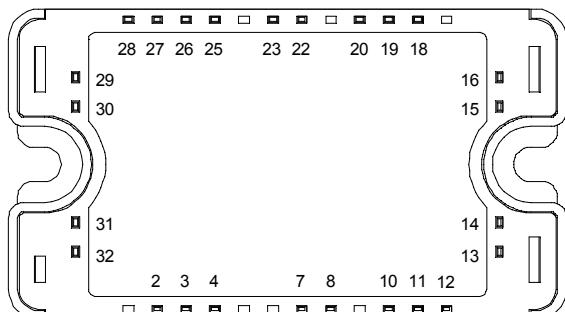
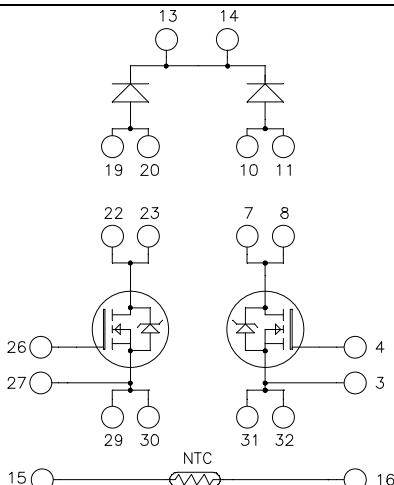


**Dual Boost chopper  
MOSFET Power Module**

$V_{DSS} = 1000V$   
 $R_{DSon} = 350m\Omega$  typ @  $T_j = 25^\circ C$   
 $I_D = 22A$  @  $T_c = 25^\circ C$



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

**Application**

- AC and DC motor control
- Switched Mode Power Supplies
- Power Factor Correction (PFC)
- Interleaved PFC

**Features**

- Power MOS 7<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
  - 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
- Low profile
- Each leg can be easily paralleled to achieve a single boost of twice the current capability
- RoHS Compliant

**Absolute maximum ratings**

Symbol	Parameter	Max ratings	Unit
$V_{DSS}$	Drain - Source Breakdown Voltage	1000	V
$I_D$	Continuous Drain Current	$T_c = 25^\circ C$	A
		$T_c = 80^\circ C$	
$I_{DM}$	Pulsed Drain current	88	
$V_{GS}$	Gate - Source Voltage	$\pm 30$	V
$R_{DSon}$	Drain - Source ON Resistance	420	$m\Omega$
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	W
$I_{AR}$	Avalanche current (repetitive and non repetitive)	25	A
$E_{AR}$	Repetitive Avalanche Energy	50	
$E_{AS}$	Single Pulse Avalanche Energy	3000	$mJ$

 **CAUTION:** These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on [www.microsemi.com](http://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	$V_{GS} = 0\text{V}, V_{DS} = 1000\text{V}$	$T_j = 25^\circ\text{C}$		100	$\mu\text{A}$
		$V_{GS} = 0\text{V}, V_{DS} = 800\text{V}$	$T_j = 125^\circ\text{C}$		500	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10\text{V}, I_D = 11\text{A}$		350	420	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 2.5\text{mA}$	3		5	$\text{V}$
$I_{GSS}$	Gate – Source Leakage Current	$V_{GS} = \pm 30\text{V}, V_{DS} = 0\text{V}$			$\pm 100$	$\text{nA}$

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS} = 0\text{V}$ $V_{DS} = 25\text{V}$ $f = 1\text{MHz}$		5.2		$\text{nF}$
$C_{oss}$	Output Capacitance			0.88		
$C_{rss}$	Reverse Transfer Capacitance			0.16		
$Q_g$	Total gate Charge	$V_{GS} = 10\text{V}$ $V_{Bus} = 500\text{V}$ $I_D = 22\text{A}$		186		$\text{nC}$
$Q_{gs}$	Gate – Source Charge			24		
$Q_{gd}$	Gate – Drain Charge			122		
$T_{d(on)}$	Turn-on Delay Time	<b>Inductive switching @ 125°C</b> $V_{GS} = 15\text{V}$ $V_{Bus} = 670\text{V}$ $I_D = 22\text{A}$ $R_G = 5\Omega$		18		$\text{ns}$
$T_r$	Rise Time			12		
$T_{d(off)}$	Turn-off Delay Time			155		
$T_f$	Fall Time			40		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ 25°C</b> $V_{GS} = 15\text{V}, V_{Bus} = 670\text{V}$ $I_D = 22\text{A}, R_G = 5\Omega$		900		$\mu\text{J}$
$E_{off}$	Turn-off Switching Energy			623		
$E_{on}$	Turn-on Switching Energy			1423		$\mu\text{J}$
$E_{off}$	Turn-off Switching Energy	<b>Inductive switching @ 125°C</b> $V_{GS} = 15\text{V}, V_{Bus} = 670\text{V}$ $I_D = 22\text{A}, R_G = 5\Omega$		779		

**Chopper diode ratings and characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit	
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage	$V_R = 1000\text{V}$		1000		$\text{V}$	
$I_{RM}$	Maximum Reverse Leakage Current		$T_j = 25^\circ\text{C}$		100	$\mu\text{A}$	
			$T_j = 125^\circ\text{C}$		500		
$I_F$	DC Forward Current		$T_c = 80^\circ\text{C}$	40		$\text{A}$	
$V_F$	Diode Forward Voltage	$I_F = 40\text{A}$		2.5	3	$\text{V}$	
		$I_F = 80\text{A}$		3.1			
		$I_F = 40\text{A}$	$T_j = 125^\circ\text{C}$	2			
$t_{rr}$	Reverse Recovery Time	$I_F = 40\text{A}$ $V_R = 667\text{V}$ $di/dt = 200\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$	250		$\text{ns}$	
			$T_j = 125^\circ\text{C}$	310			
$Q_{rr}$	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$	415		$\text{nC}$	
			$T_j = 125^\circ\text{C}$	1650			

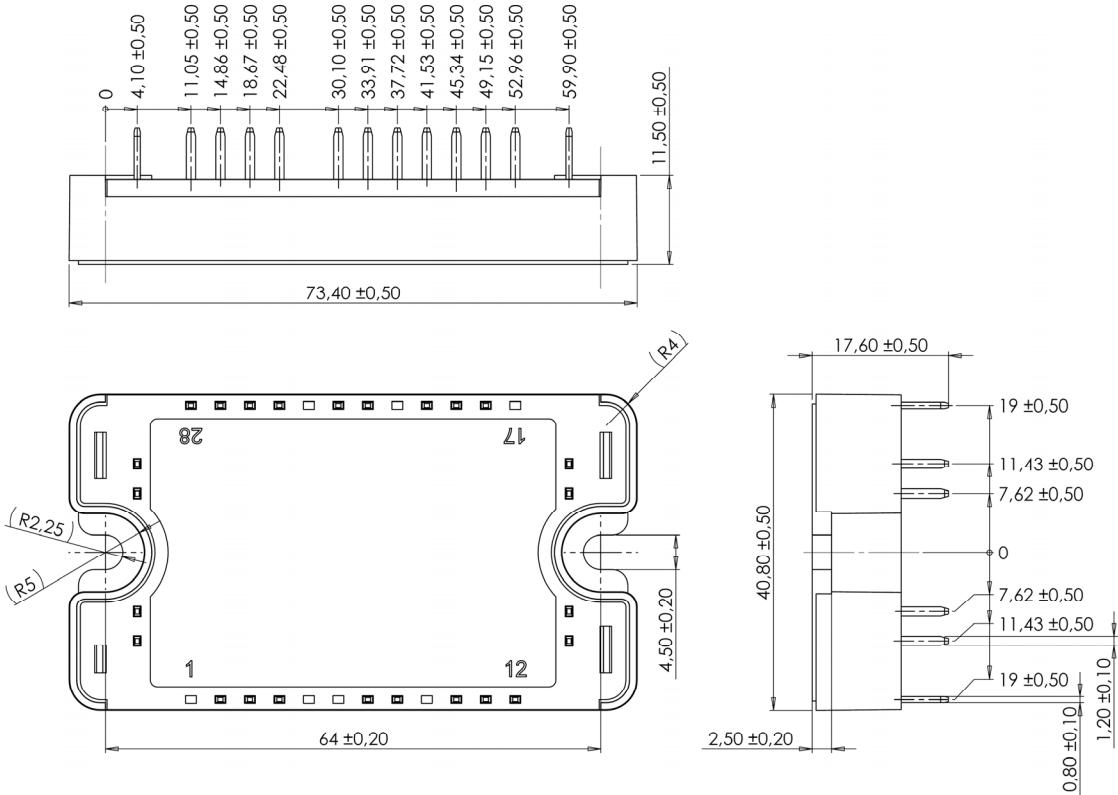
**Thermal and package characteristics**

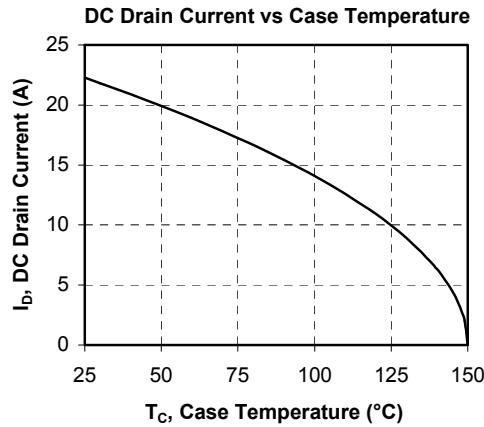
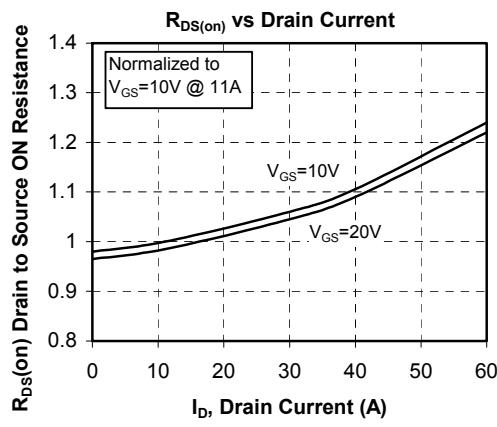
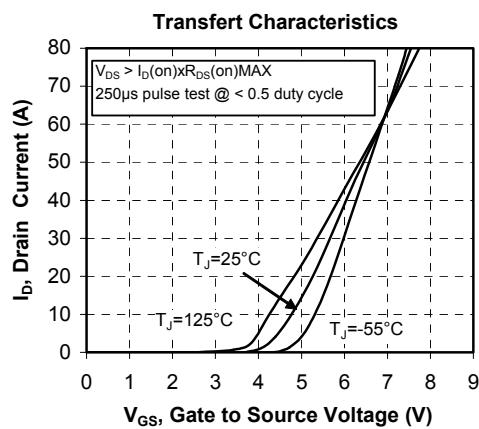
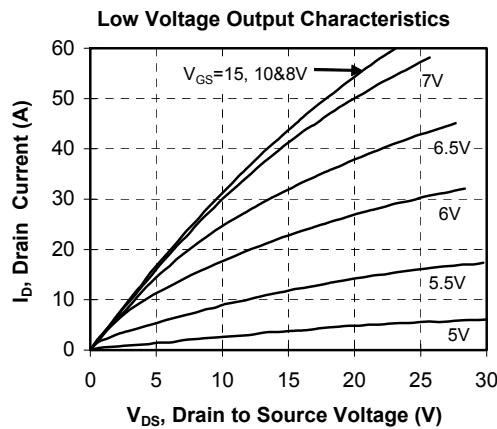
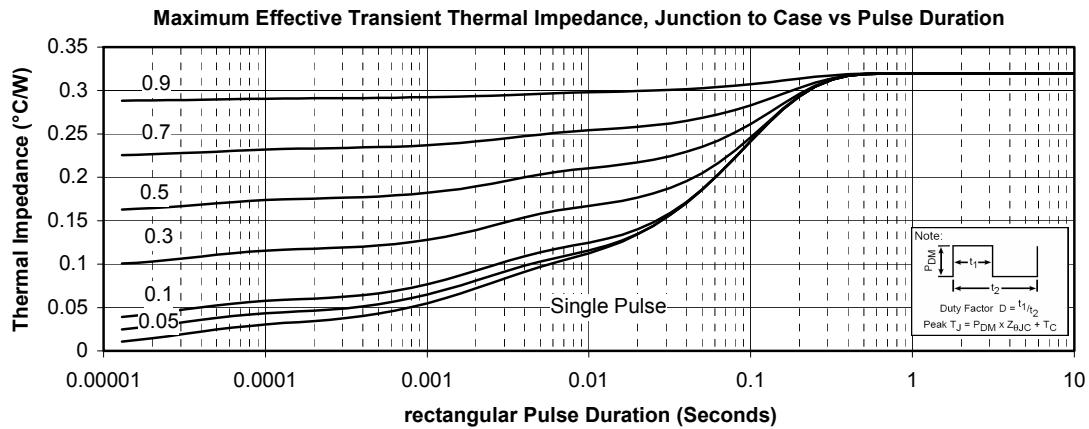
Symbol	Characteristic		Min	Typ	Max	Unit
R <sub>thJC</sub>	Junction to Case Thermal Resistance	Transistor			0.32	°C/W
		Chopper diode			1.2	
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz		4000			V
T <sub>J</sub>	Operating junction temperature range		-40		150	
T <sub>STG</sub>	Storage Temperature Range		-40		125	°C
T <sub>C</sub>	Operating Case Temperature		-40		100	
Torque	Mounting torque	To heatsink	M4	2	3	N.m
Wt	Package Weight				110	g

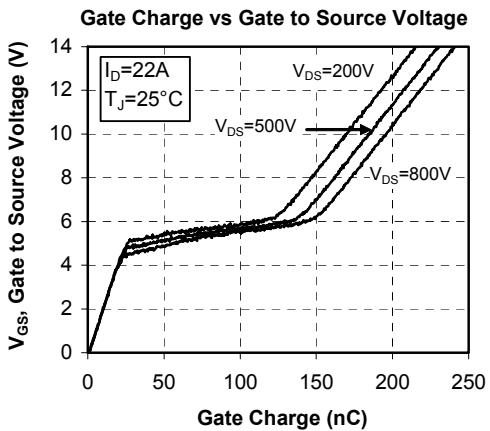
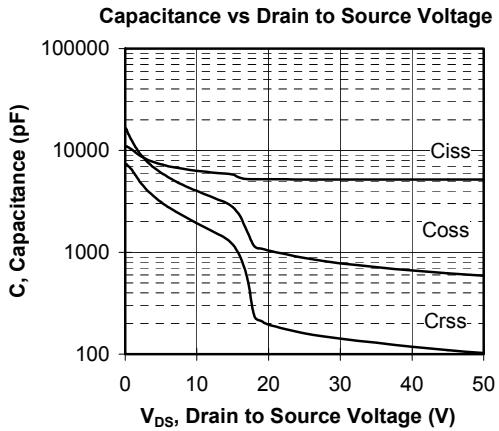
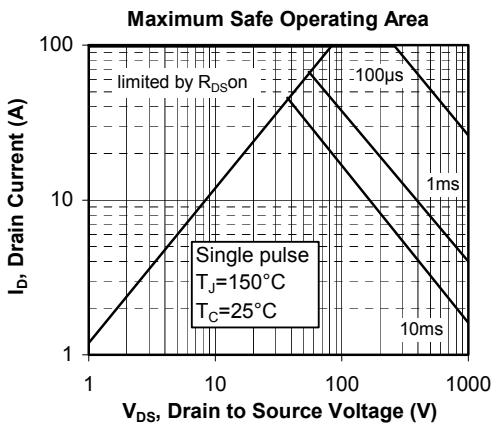
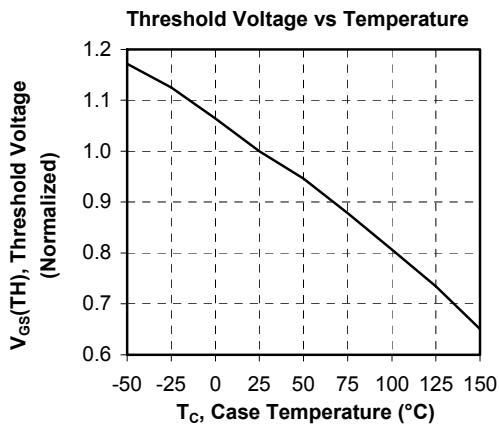
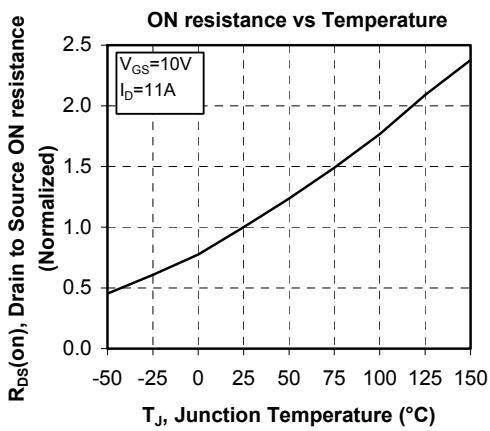
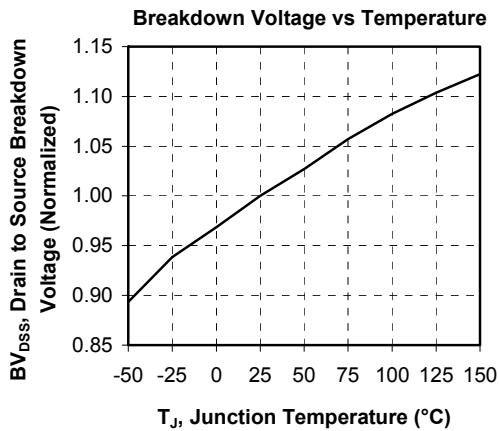
**Temperature sensor NTC** (see application note APT0406 on [www.microsemi.com](http://www.microsemi.com) for more information).

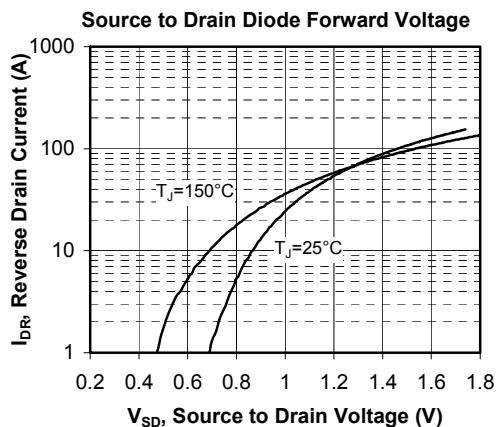
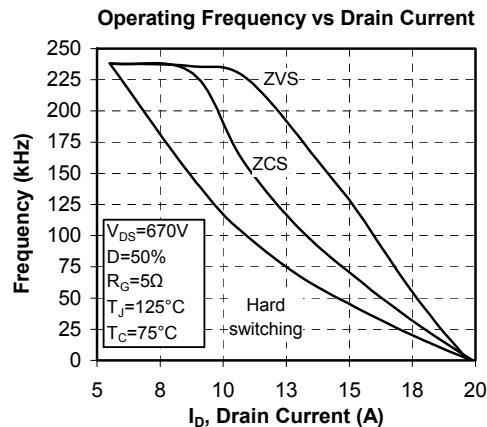
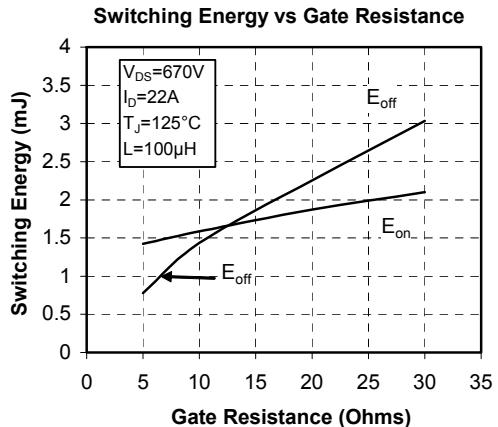
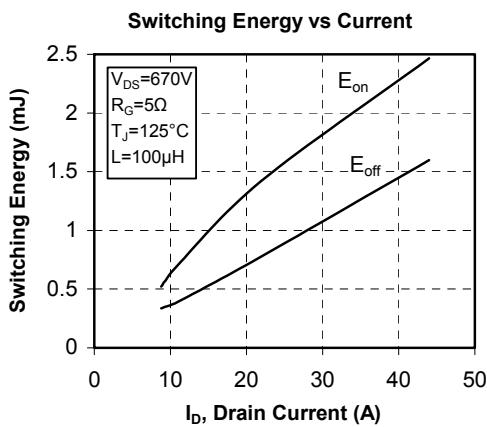
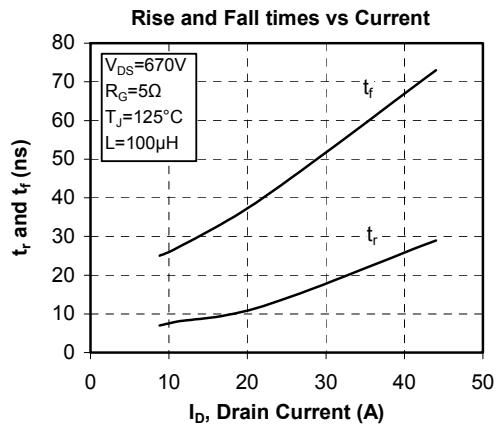
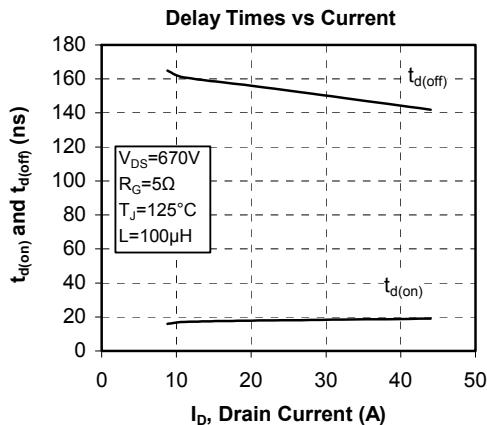
Symbol	Characteristic		Min	Typ	Max	Unit
R <sub>25</sub>	Resistance @ 25°C			50		kΩ
ΔR <sub>25</sub> /R <sub>25</sub>				5		%
B <sub>25/85</sub>	T <sub>25</sub> = 298.15 K			3952		K
ΔB/B		T <sub>C</sub> =100°C		4		%

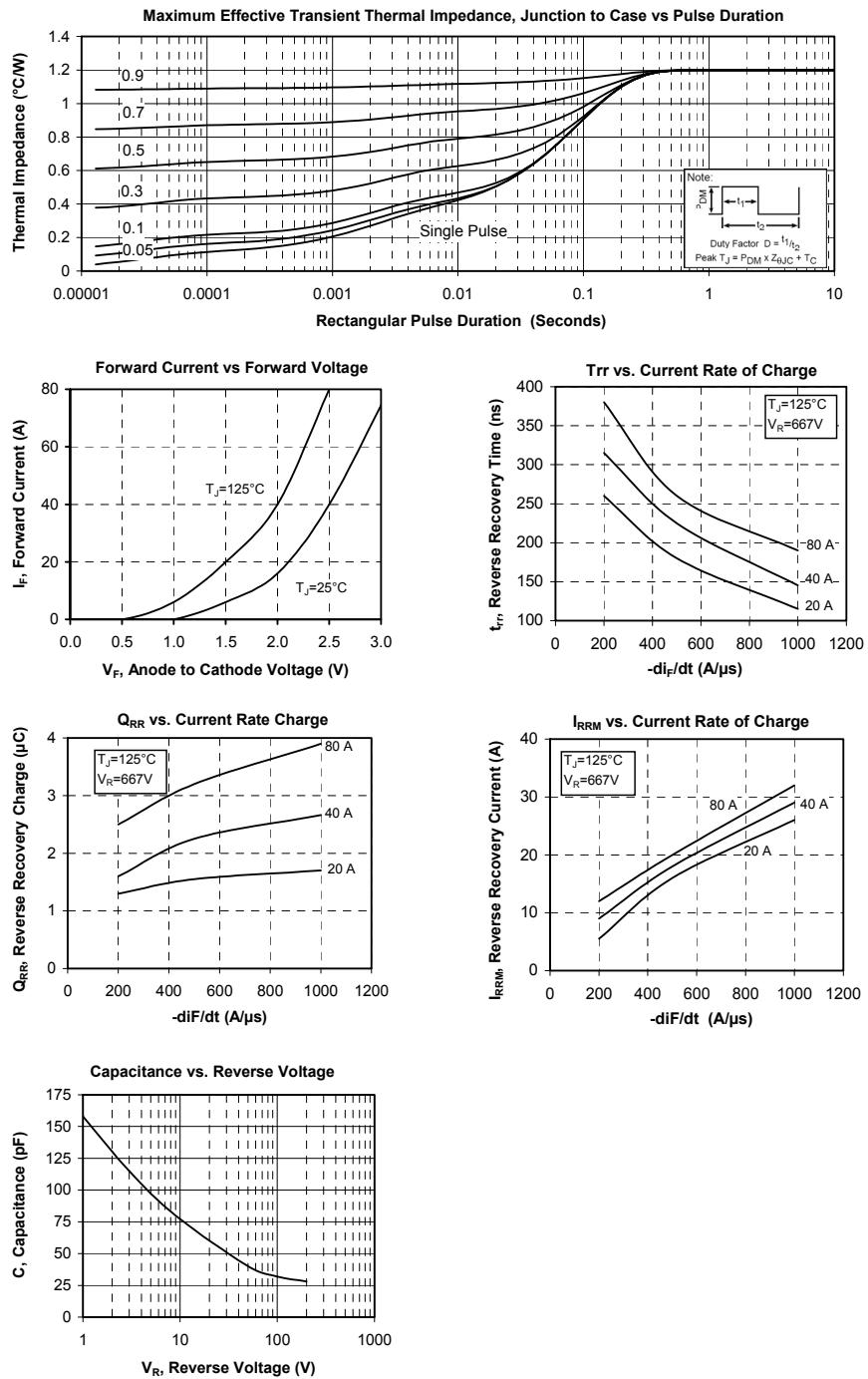
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]} \quad \begin{matrix} T: \text{Thermistor temperature} \\ R_T: \text{Thermistor value at } T \end{matrix}$$

**SP3 Package outline** (dimensions in mm)

 See application note 1901 - Mounting Instructions for SP3 Power Modules on [www.microsemi.com](http://www.microsemi.com)

**Typical CoolMOS Performance Curve**






**Typical chopper diode performance curve**


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