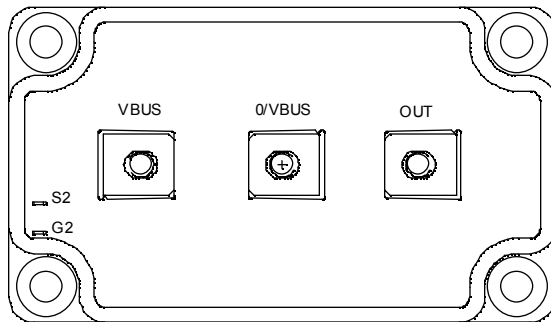
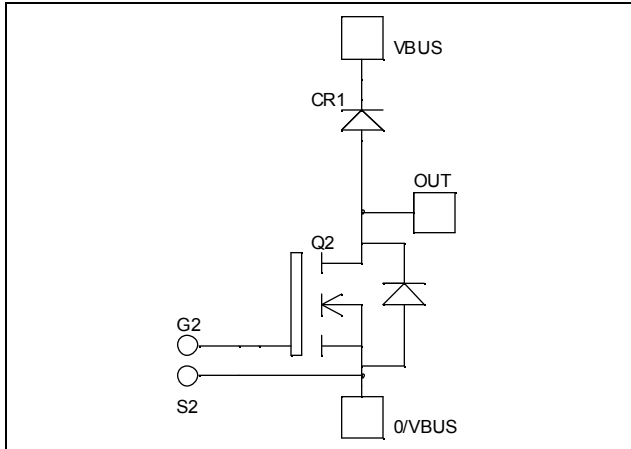


## Boost chopper MOSFET Power Module

$V_{DSS} = 500V$   
 $R_{DSon} = 17m\Omega \text{ typ @ } T_j = 25^\circ C$   
 $I_D = 180A \text{ @ } T_c = 25^\circ C$



### Application

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

### 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
  - M5 power connectors
- High level of integration

### Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Low profile
- RoHS Compliant

### Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
$V_{DSS}$	Drain - Source Breakdown Voltage	500	V
$I_D$	Continuous Drain Current	$T_c = 25^\circ C$	180
		$T_c = 80^\circ C$	135
$I_{DM}$	Pulsed Drain current	720	A
$V_{GS}$	Gate - Source Voltage	$\pm 30$	V
$R_{DSon}$	Drain - Source ON Resistance	20	$m\Omega$
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	1250
$I_{AR}$	Avalanche current (repetitive and non repetitive)	51	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](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	$V_{GS} = 0\text{V}, V_{DS} = 500\text{V}$			400	$\mu\text{A}$
		$V_{GS} = 0\text{V}, V_{DS} = 400\text{V}$			2000	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10\text{V}, I_D = 90\text{A}$		17	20	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 10\text{mA}$	3		5	V
$I_{GSS}$	Gate – Source Leakage Current	$V_{GS} = \pm 30\text{V}, V_{DS} = 0\text{V}$			$\pm 200$	nA

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS} = 0\text{V}$		28		nF
$C_{oss}$	Output Capacitance	$V_{DS} = 25\text{V}$		5.6		
$C_{rss}$	Reverse Transfer Capacitance	$f = 1\text{MHz}$		0.36		
$Q_g$	Total gate Charge	$V_{GS} = 10\text{V}$		560		nC
$Q_{gs}$	Gate – Source Charge	$V_{Bus} = 250\text{V}$		160		
$Q_{gd}$	Gate – Drain Charge	$I_D = 180\text{A}$		280		
$T_{d(on)}$	Turn-on Delay Time	<b>Inductive switching @ <math>125^\circ\text{C}</math></b> $V_{GS} = 15\text{V}$ $V_{Bus} = 333\text{V}$ $I_D = 180\text{A}$ $R_G = 0.5\Omega$		21		ns
$T_r$	Rise Time			38		
$T_{d(off)}$	Turn-off Delay Time			75		
$T_f$	Fall Time			93		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ <math>25^\circ\text{C}</math></b> $V_{GS} = 15\text{V}, V_{Bus} = 333\text{V}$ $I_D = 180\text{A}, R_G = 0.5\Omega$		4140		$\mu\text{J}$
$E_{off}$	Turn-off Switching Energy			3380		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ <math>125^\circ\text{C}</math></b> $V_{GS} = 15\text{V}, V_{Bus} = 333\text{V}$ $I_D = 180\text{A}, R_G = 0.5\Omega$		6224		$\mu\text{J}$
$E_{off}$	Turn-off Switching Energy			4052		

**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	$V_R = 600\text{V}$	$T_j = 25^\circ\text{C}$		500	$\mu\text{A}$
			$T_j = 125^\circ\text{C}$		1000	
$I_F$	DC Forward Current			180		A
$V_F$	Diode Forward Voltage	$I_F = 180\text{A}$		1.6	1.8	V
		$I_F = 360\text{A}$		1.9		
		$I_F = 180\text{A}$	$T_j = 125^\circ\text{C}$		1.4	
$t_{rr}$	Reverse Recovery Time	$I_F = 180\text{A}$ $V_R = 400\text{V}$ $di/dt = 600\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$		130	ns
			$T_j = 125^\circ\text{C}$		170	
$Q_{rr}$	Reverse Recovery Charge	$I_F = 180\text{A}$ $V_R = 400\text{V}$ $di/dt = 600\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$		660	nC
			$T_j = 125^\circ\text{C}$		2760	

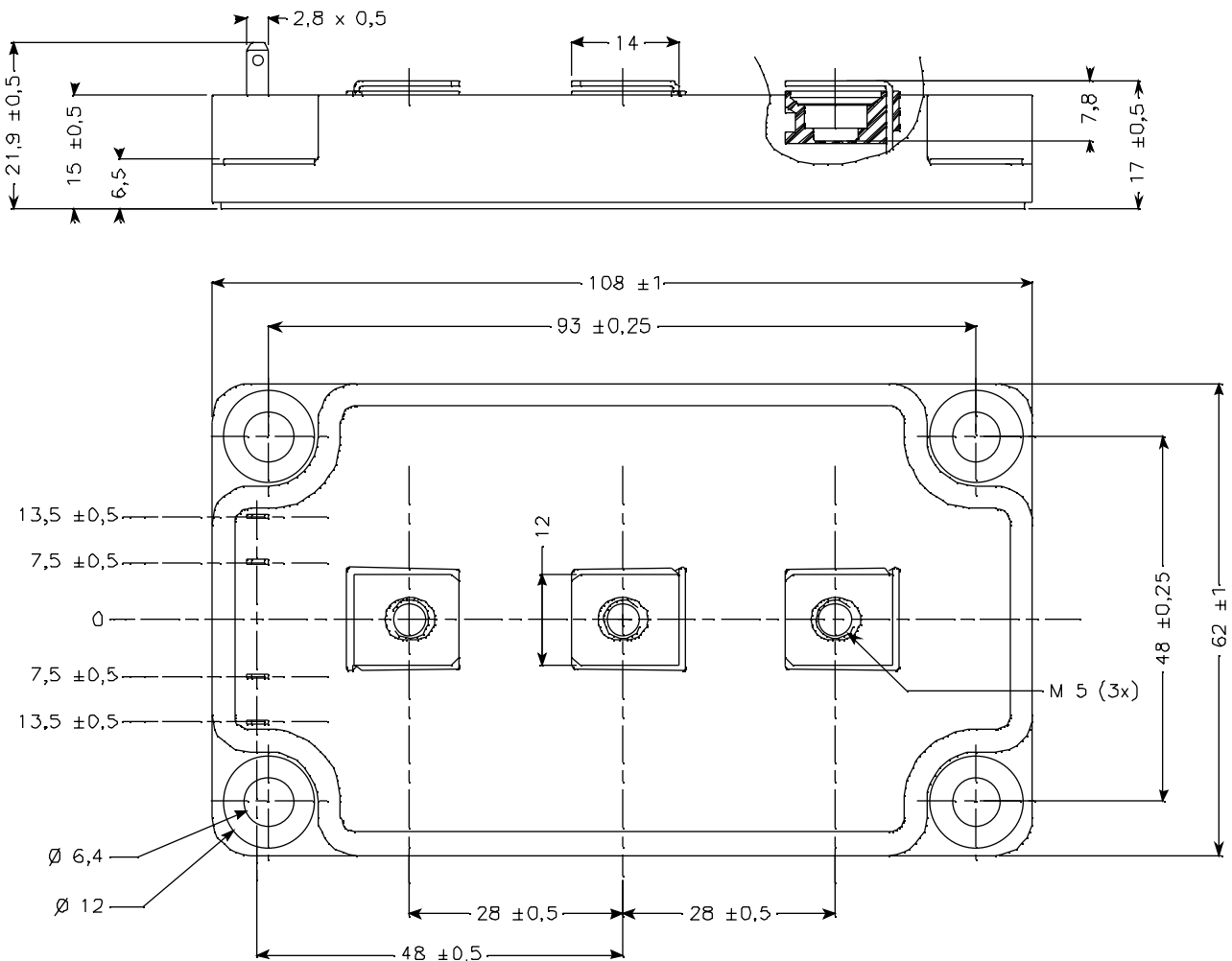
## Thermal and package characteristics

*Symbol Characteristic*

*Min Typ Max Unit*

<i>Symbol</i>	<i>Characteristic</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	
R <sub>thJC</sub>	Junction to Case Thermal Resistance	Transistor			0.1	°C/W
		Diode			0.32	
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t = 1 min, I <sub>isol</sub> < 1mA, 50/60Hz	2500			V	
T <sub>J</sub>	Operating junction temperature range	-40		150	°C	
T <sub>STG</sub>	Storage Temperature Range	-40		125		
T <sub>C</sub>	Operating Case Temperature	-40		100		
Torque	Mounting torque	To heatsink	M6	3	5	N.m
		For terminals	M5	2	3.5	
Wt	Package Weight				280	g

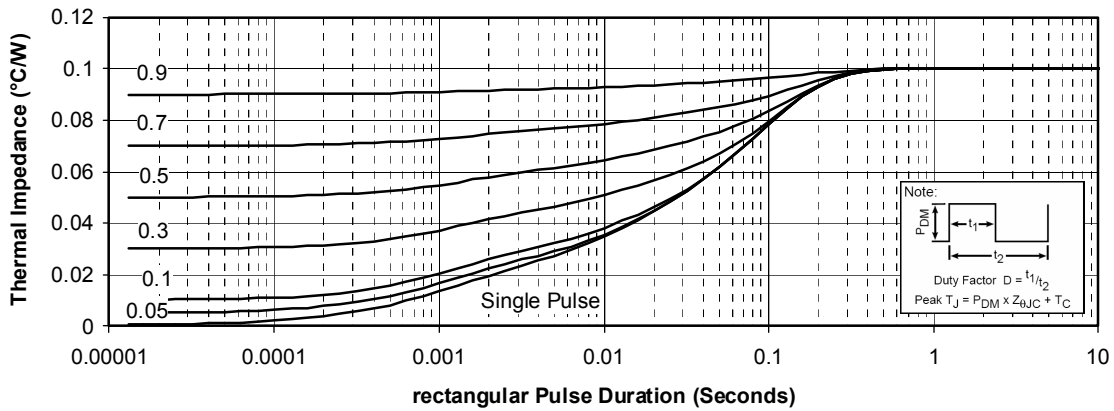
## SP6 Package outline (dimensions in mm)



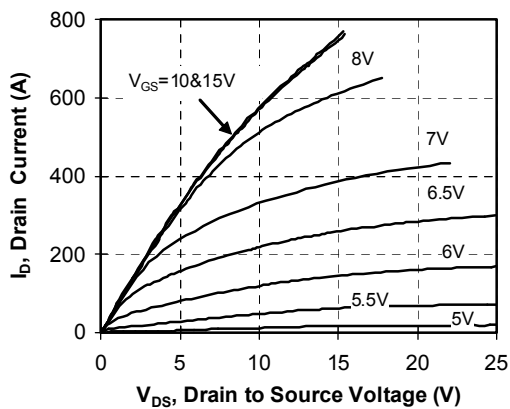
See application note APT0601 - Mounting Instructions for SP6 Power Modules on [www.microsemi.com](http://www.microsemi.com)

## Typical Performance Curve

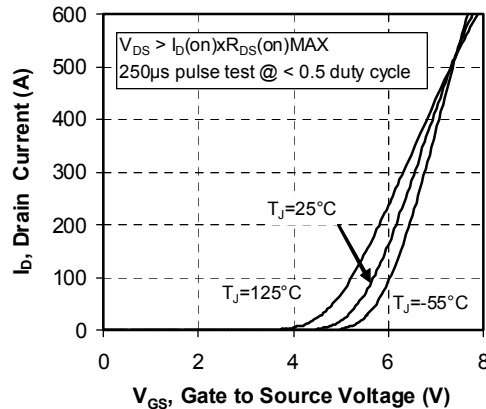
Maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration



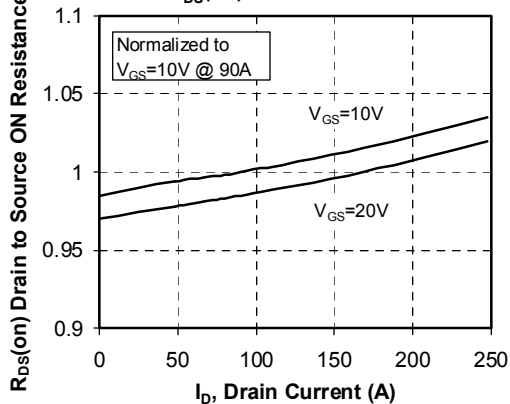
Low Voltage Output Characteristics



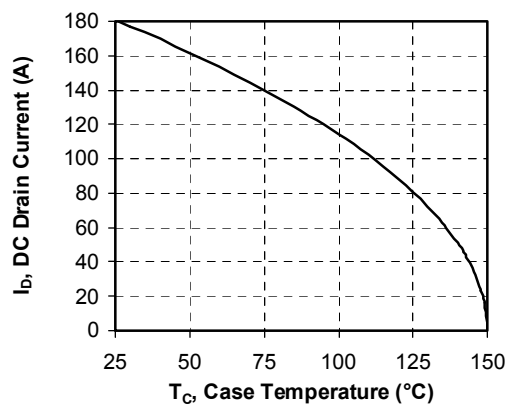
Transfer Characteristics

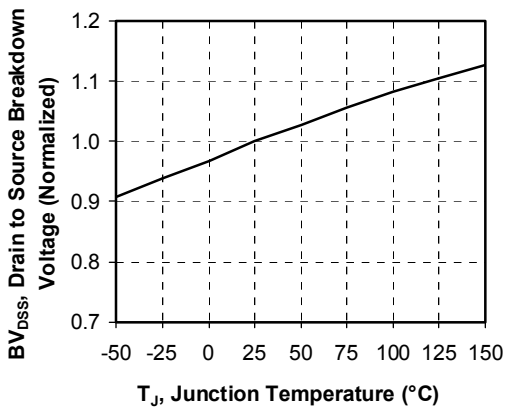
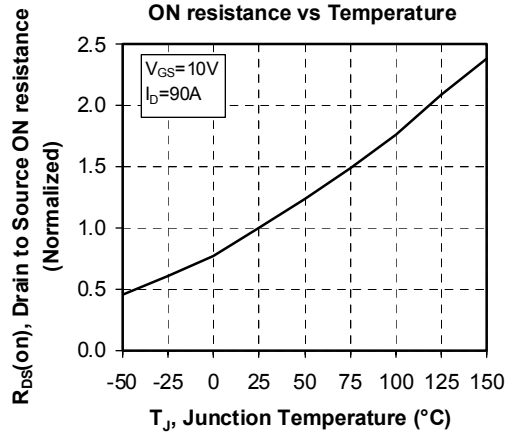
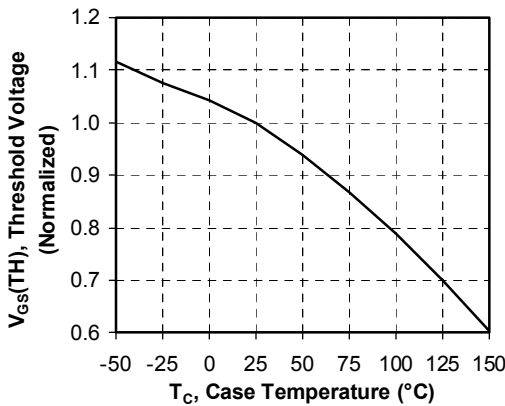
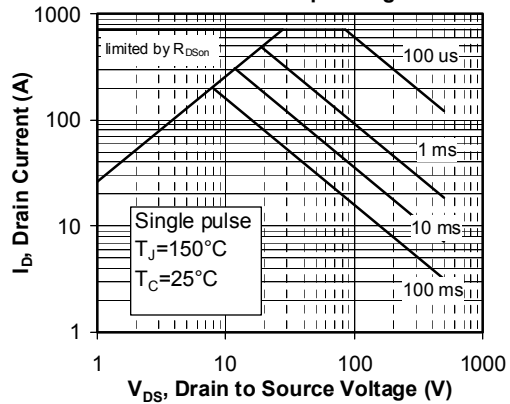
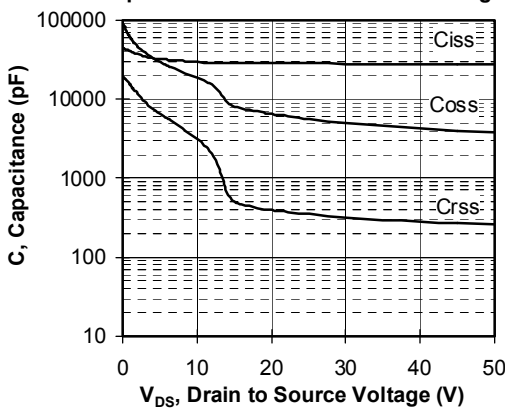
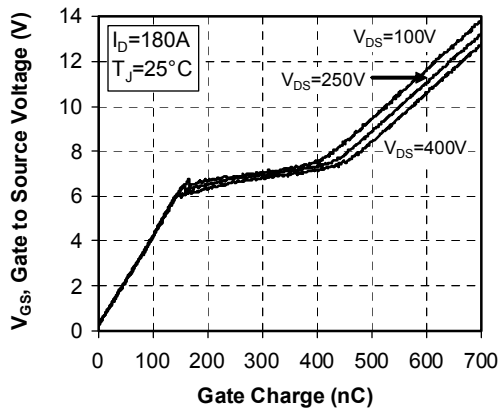


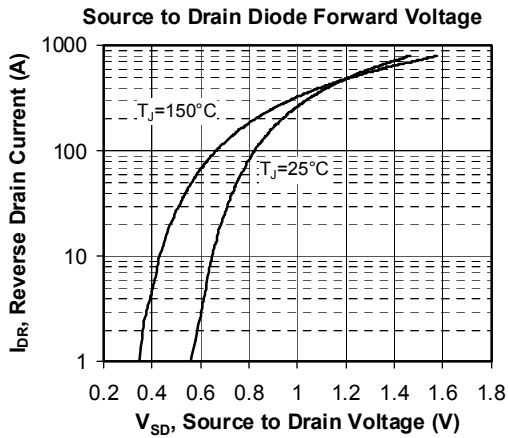
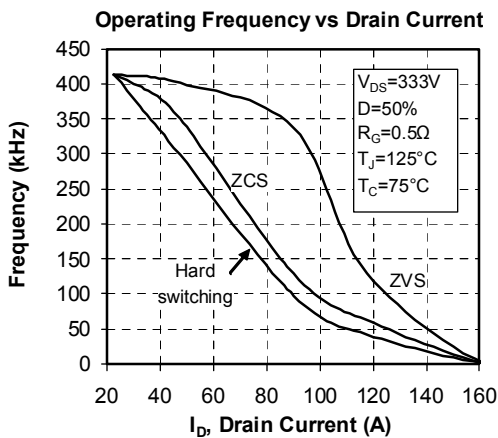
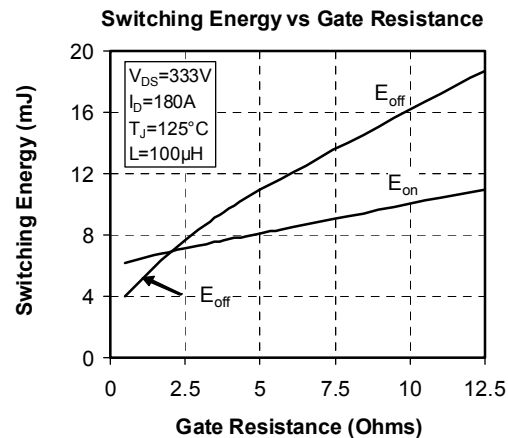
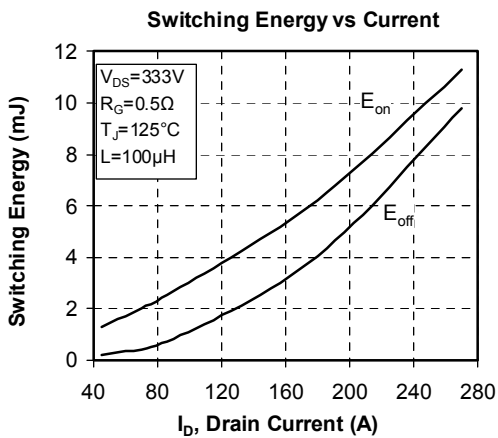
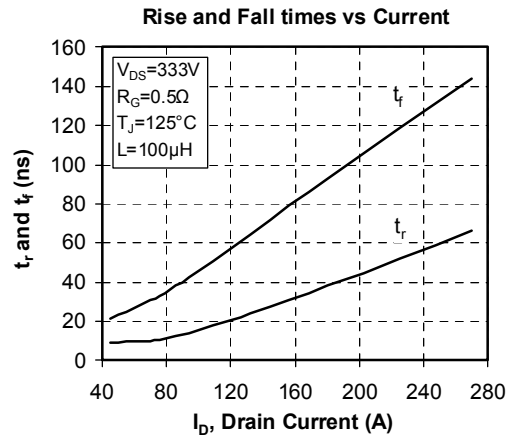
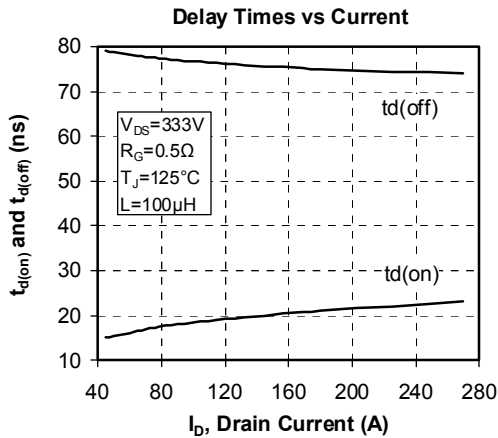
$R_{DS(on)}$  vs Drain Current



DC Drain Current vs Case Temperature



**Breakdown Voltage vs Temperature**

**ON resistance vs Temperature**

**Threshold Voltage vs Temperature**

**Maximum Safe Operating Area**

**Capacitance vs Drain to Source Voltage**

**Gate Charge vs Gate to Source Voltage**




Microsemi reserves the right to change, without notice, the specifications and information contained herein

Microsemi's products are covered by one or more of U.S. patents 4,895,810 5,045,903 5,089,434 5,182,234 5,019,522 5,262,336 6,503,786 5,256,583 4,748,103 5,283,202 5,231,474 5,434,095 5,528,058 and foreign patents. U.S. and Foreign patents pending. All Rights Reserved.