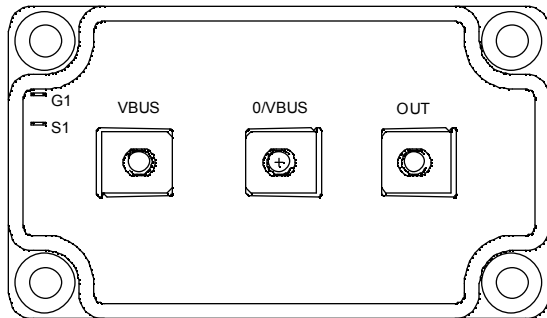
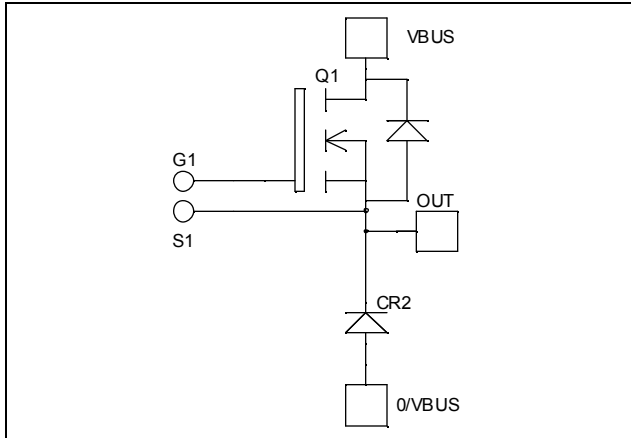


## Buck chopper MOSFET Power Module

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



### Application

- AC and DC motor control
- Switched Mode Power Supplies

### 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	
$V_{GS}$	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	

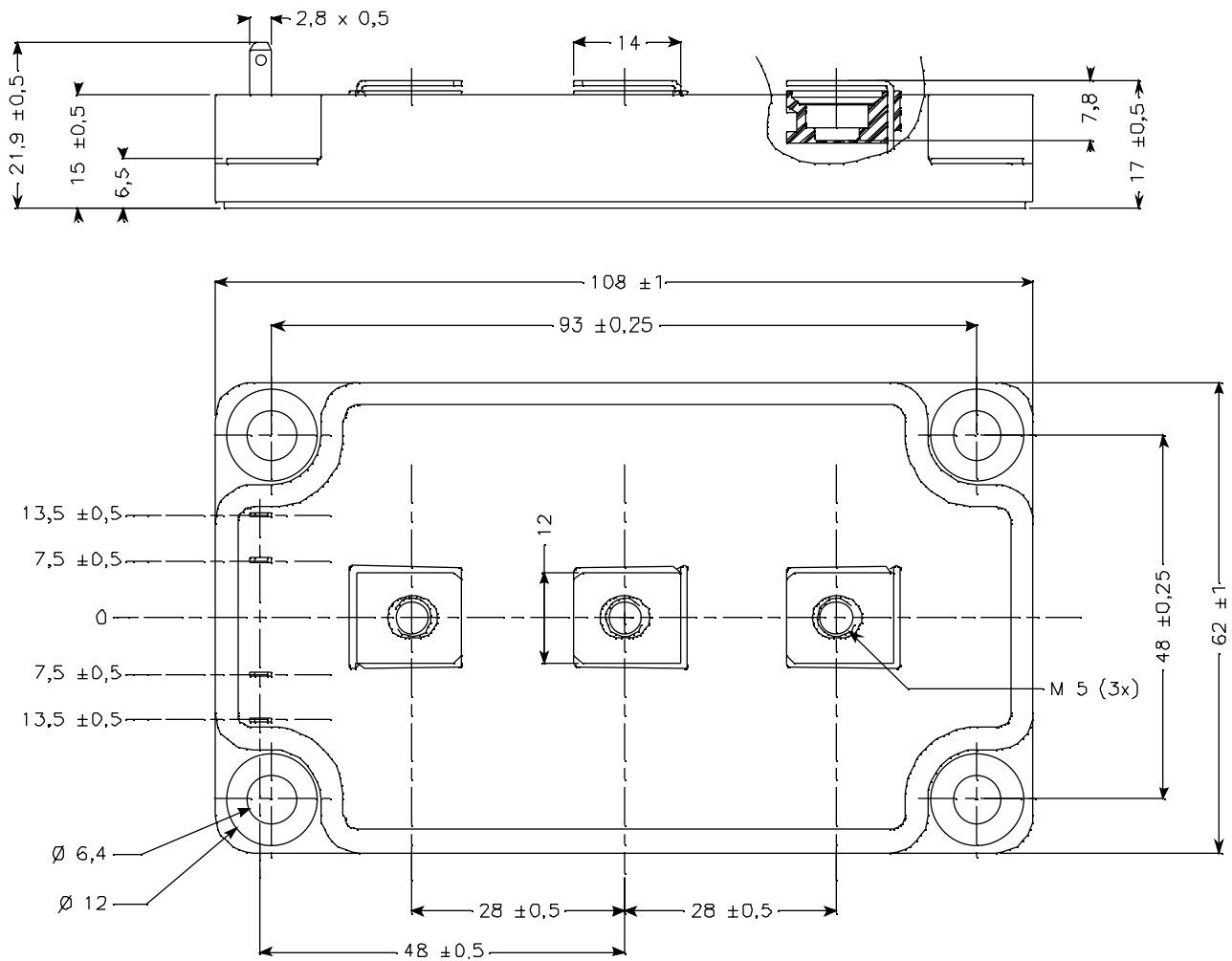
## Thermal and package characteristics

*Symbol Characteristic*

*Min Typ Max Unit*

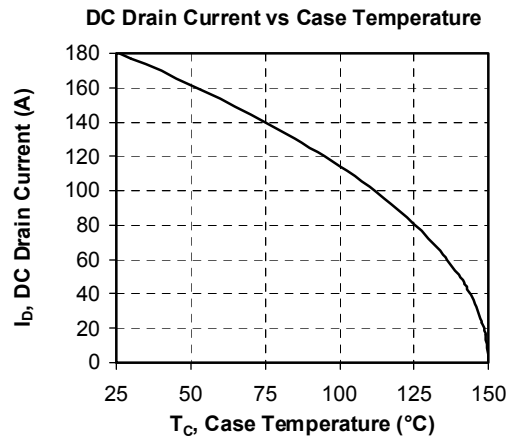
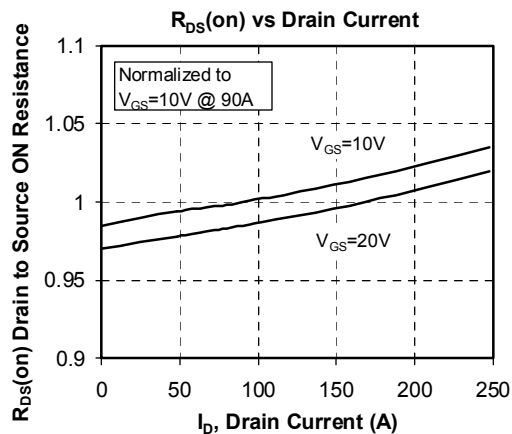
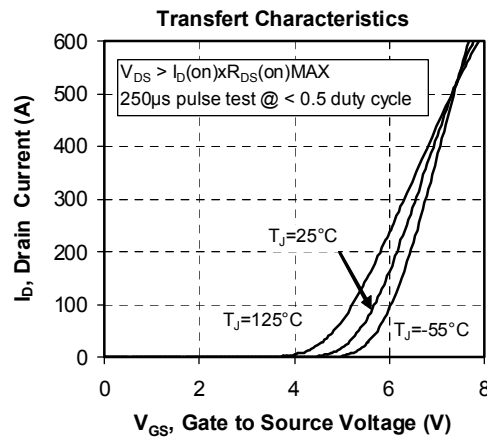
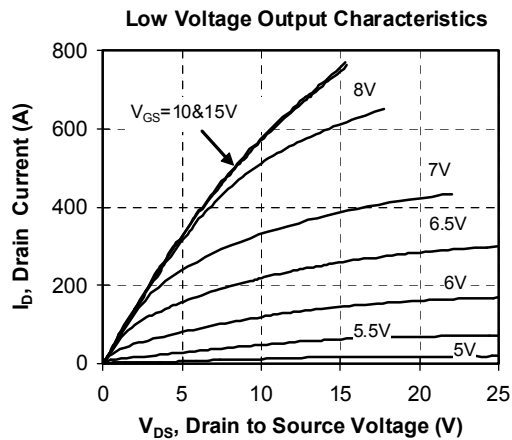
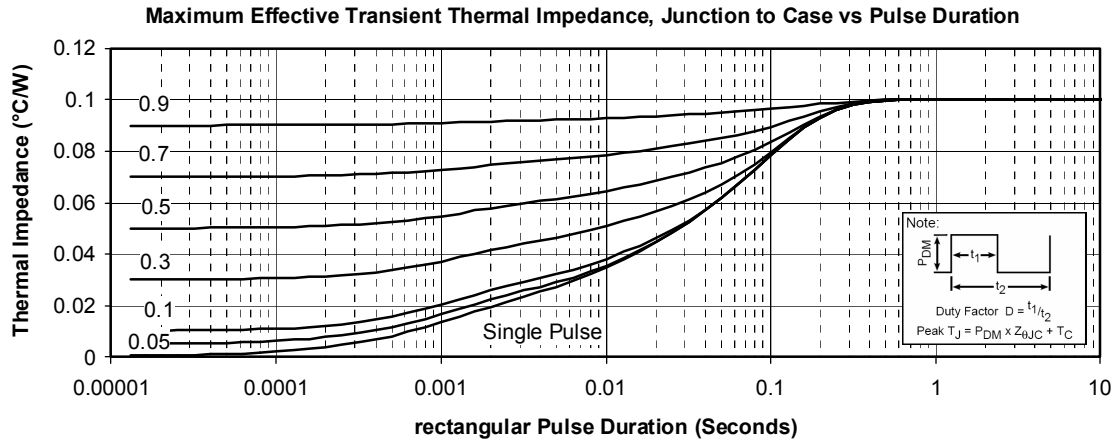
<i>Symbol</i>	<i>Characteristic</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	
R <sub>thJC</sub>	Junction to Case Thermal Resistance	Transistor			0.1	°C/W
		Diode			0.32	
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t = 1 min, I <sub>isol</sub> < 1mA, 50/60Hz	2500			V	
T <sub>J</sub>	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

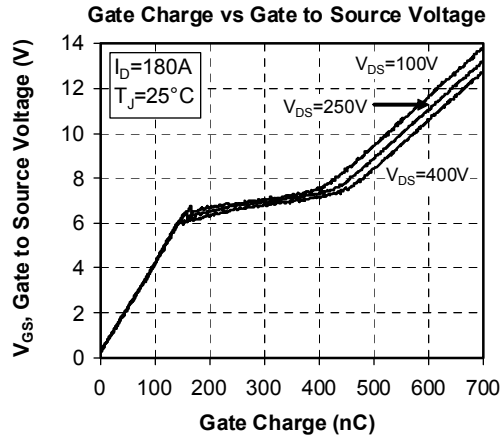
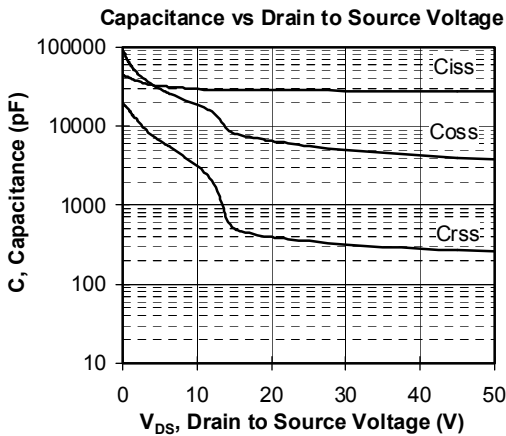
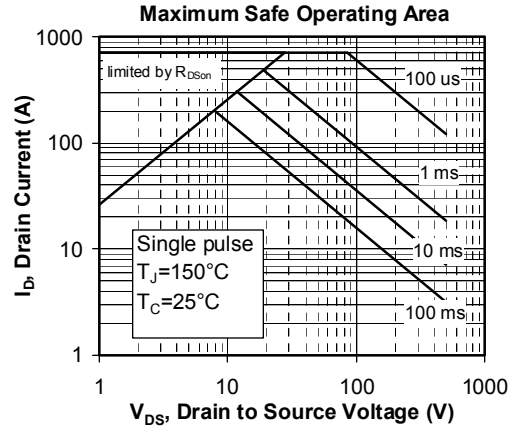
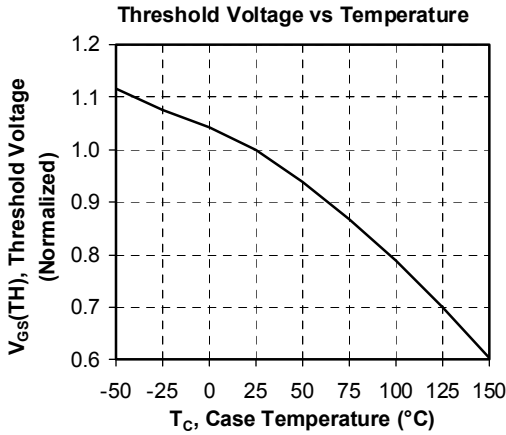
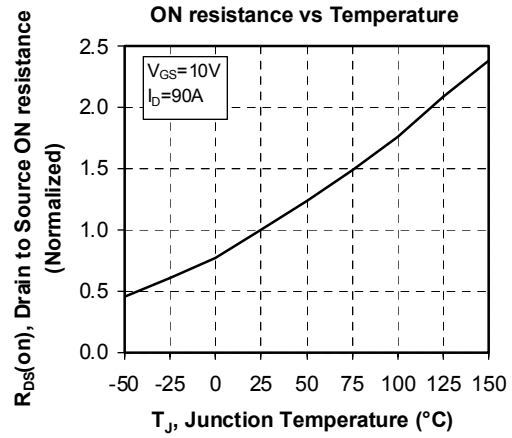
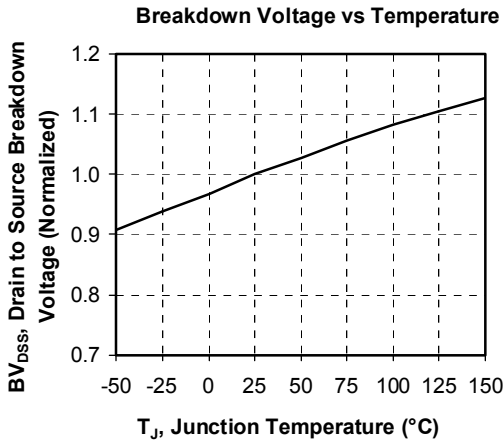
## SP6 Package outline (dimensions in mm)

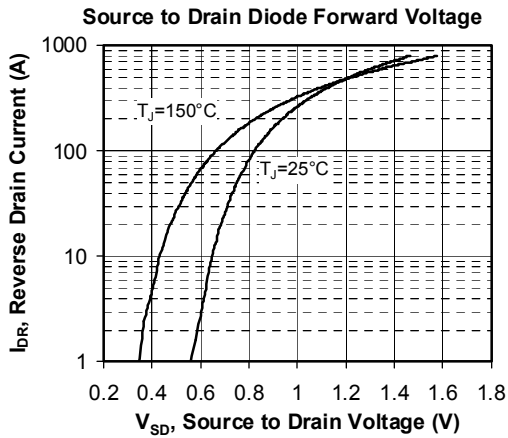
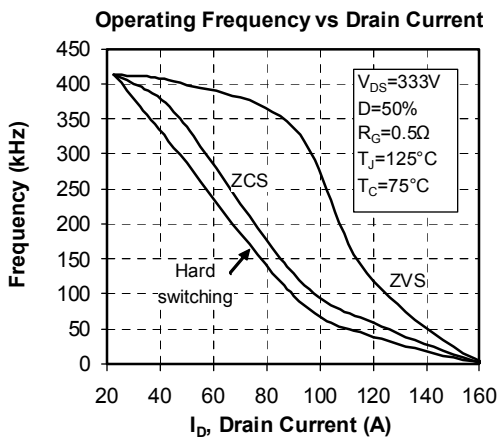
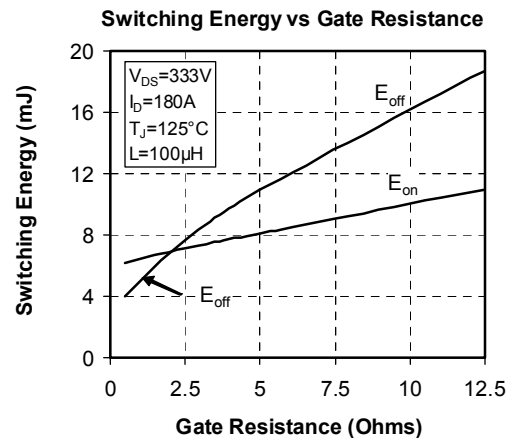
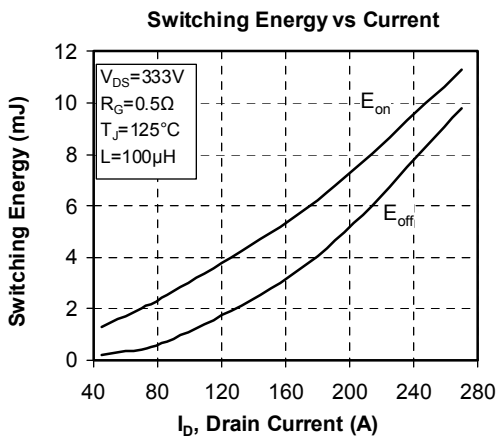
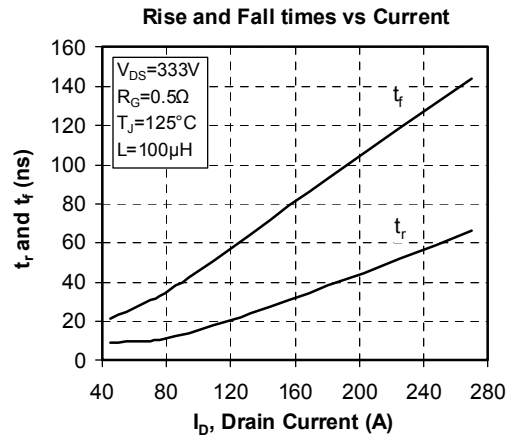
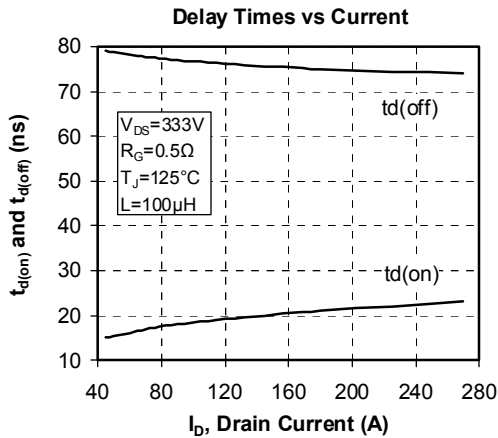


See application note APT0601 - Mounting Instructions for SP6 Power Modules on [www.microsemi.com](http://www.microsemi.com)

## Typical Performance Curve







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