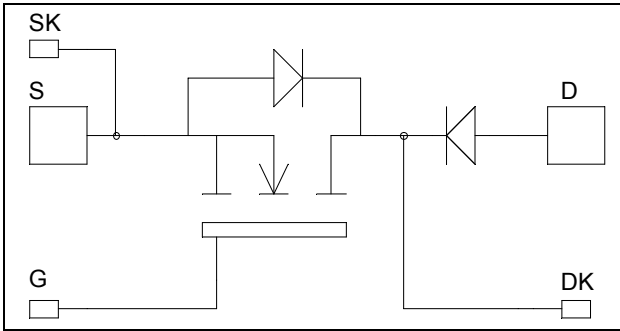


*Single switch  
with Series diode  
MOSFET Power Module*

**$V_{DSS} = 1000V$**   
 **$R_{DSon} = 45m\Omega$  typ @  $T_j = 25^\circ C$**   
 **$I_D = 215A$  @  $T_c = 25^\circ C$**

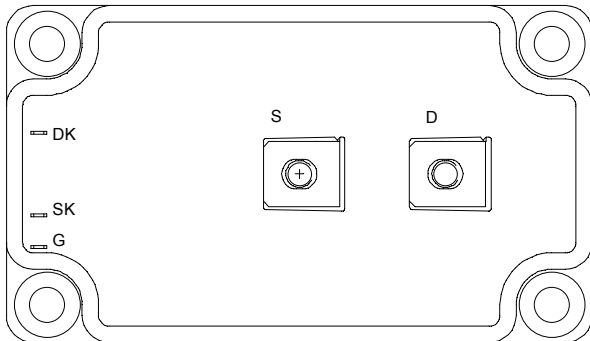


#### Application

- Zero Current Switching resonant mode

#### 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
- AlN substrate for improved thermal performance



#### 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	1000	V
$I_D$	Continuous Drain Current	$T_c = 25^\circ C$	215
		$T_c = 80^\circ C$	160
$I_{DM}$	Pulsed Drain current	860	A
$V_{GS}$	Gate - Source Voltage	$\pm 30$	V
$R_{DSon}$	Drain - Source ON Resistance	52	$m\Omega$
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	5000
$I_{AR}$	Avalanche current (repetitive and non repetitive)	30	A
$E_{AR}$	Repetitive Avalanche Energy	50	mJ
$E_{AS}$	Single Pulse Avalanche Energy	3200	

**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	$V_{GS} = 0V, V_{DS} = 1000V$   $T_j = 25^\circ\text{C}$			600	$\mu\text{A}$
		$V_{GS} = 0V, V_{DS} = 800V$   $T_j = 125^\circ\text{C}$			3	$\text{mA}$
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 107.5A$		45	52	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 30\text{mA}$	3		5	V
$I_{GSS}$	Gate – Source Leakage Current	$V_{GS} = \pm 30V, V_{DS} = 0V$			$\pm 600$	$\text{nA}$

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1\text{MHz}$		42.7		$\text{nF}$
$C_{oss}$	Output Capacitance			7.6		
$C_{rss}$	Reverse Transfer Capacitance			1.3		
$Q_g$	Total gate Charge	$V_{GS} = 10V$ $V_{Bus} = 500V$ $I_D = 215A$		1602		$\text{nC}$
$Q_{gs}$	Gate – Source Charge			204		
$Q_{gd}$	Gate – Drain Charge			1038		
$T_{d(on)}$	Turn-on Delay Time	<b>Inductive switching @ <math>125^\circ\text{C}</math></b> $V_{GS} = 15V$ $V_{Bus} = 670V$ $I_D = 215A$ $R_G = 0.5\Omega$		18		$\text{ns}$
$T_r$	Rise Time			14		
$T_{d(off)}$	Turn-off Delay Time			140		
$T_f$	Fall Time			55		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ <math>25^\circ\text{C}</math></b> $V_{GS} = 15V, V_{Bus} = 670V$ $I_D = 215A, R_G = 0.5\Omega$		7.2		$\text{mJ}$
$E_{off}$	Turn-off Switching Energy			4.3		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ <math>125^\circ\text{C}</math></b> $V_{GS} = 15V, V_{Bus} = 670V$ $I_D = 215A, R_G = 0.5\Omega$		12		$\text{mJ}$
$E_{off}$	Turn-off Switching Energy			5.8		

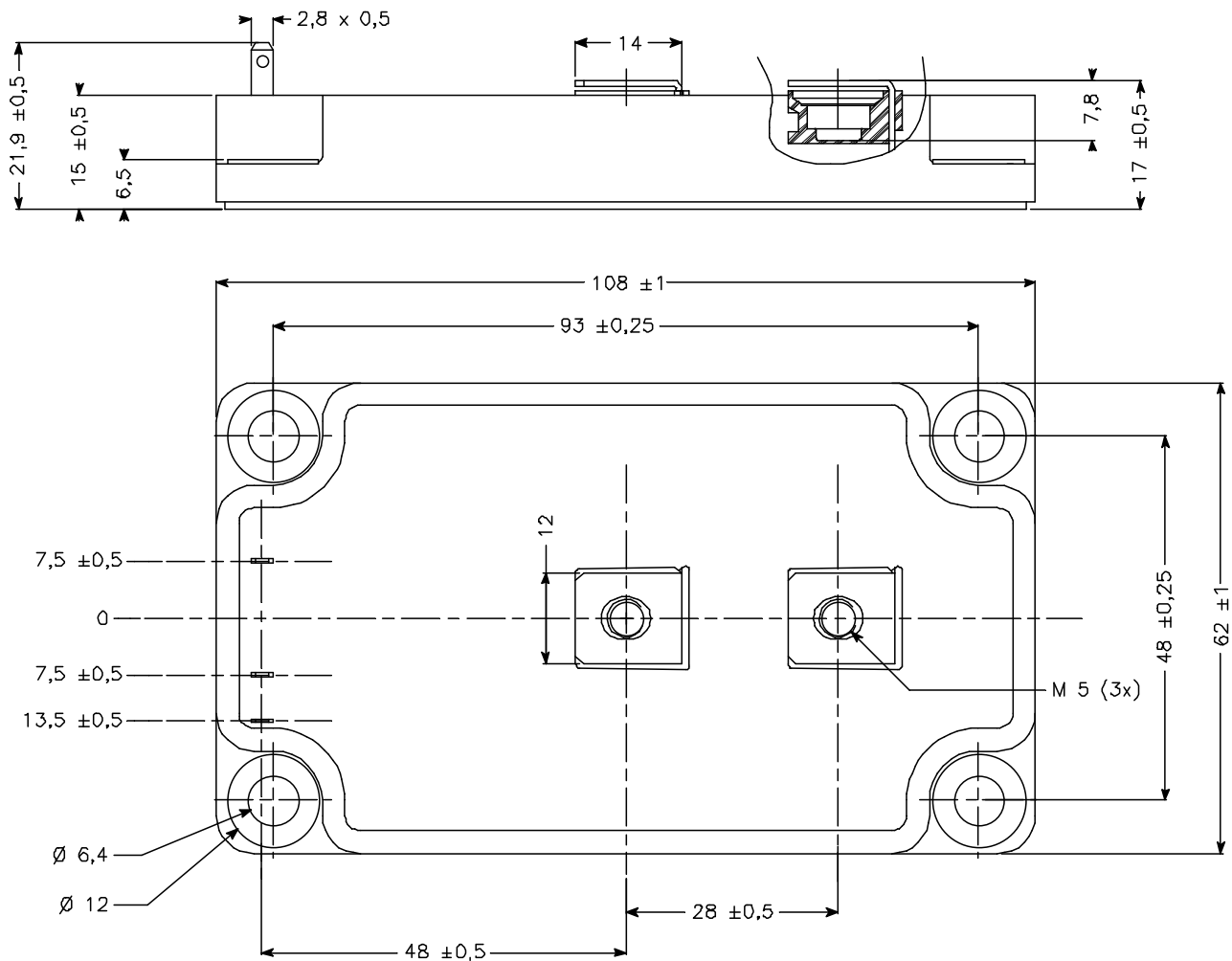
**Series diode ratings and characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{RRM}$	Maximum Repetitive Reverse Voltage		1200			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 1200V$	$T_j = 25^\circ\text{C}$		600	$\mu\text{A}$
			$T_j = 125^\circ\text{C}$		2000	
$I_F$	DC Forward Current			360		A
$V_F$	Diode Forward Voltage	$I_F = 360A$		2.5	3	V
		$I_F = 720A$		3		
		$I_F = 360A$   $T_j = 125^\circ\text{C}$		1.8		
$t_{rr}$	Reverse Recovery Time	$I_F = 360A$ $V_R = 800V$ $di/dt = 1200A/\mu\text{s}$	$T_j = 25^\circ\text{C}$		265	$\text{ns}$
			$T_j = 125^\circ\text{C}$		350	
$Q_{rr}$	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$		3.3	$\mu\text{C}$
			$T_j = 125^\circ\text{C}$		17.3	

## Thermal and package characteristics

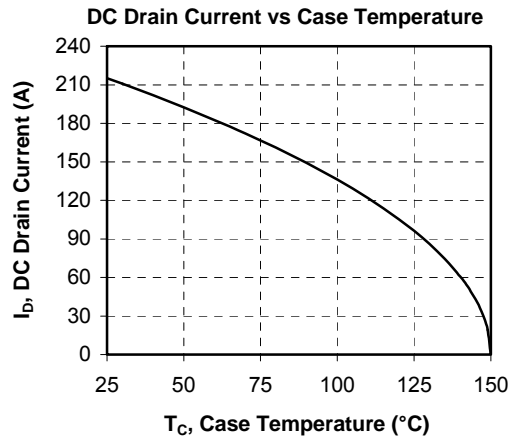
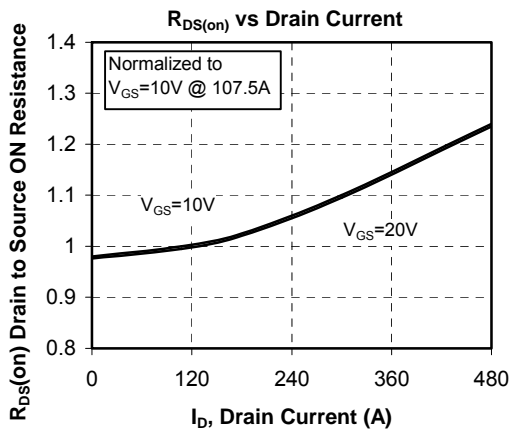
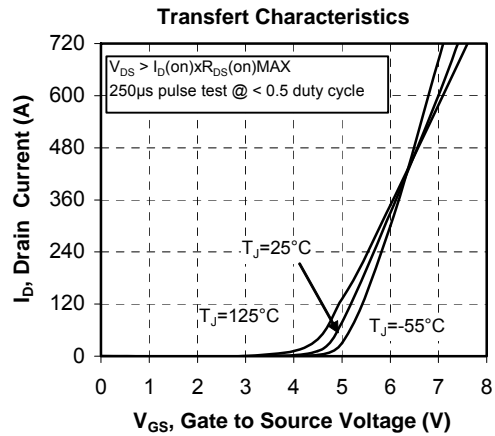
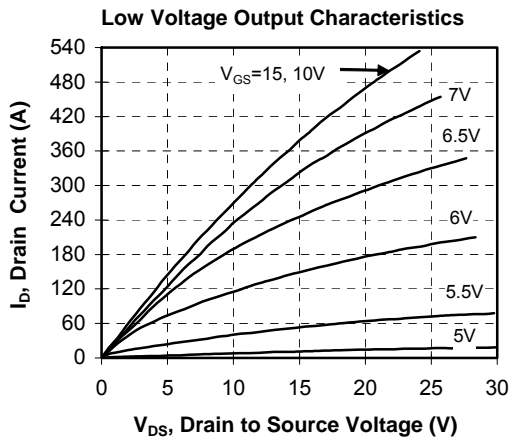
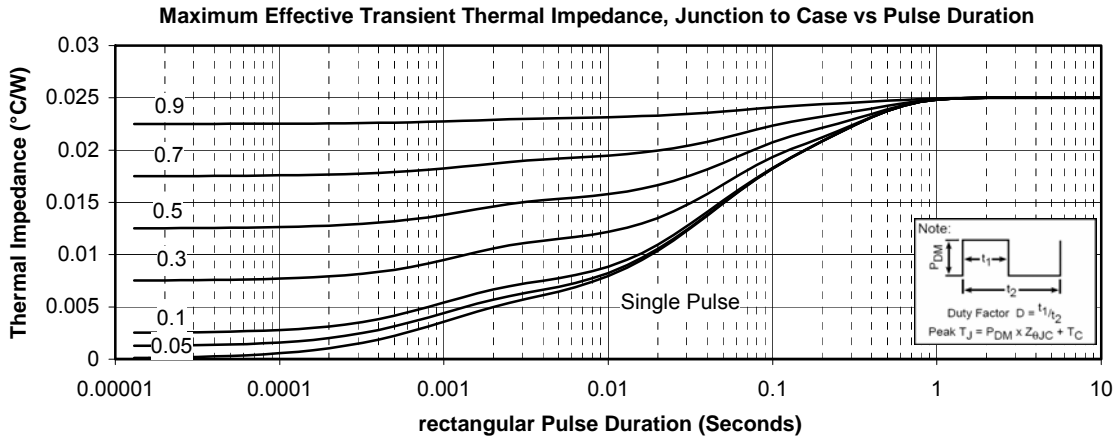
Symbol	Characteristic	Min	Typ	Max	Unit	
R <sub>thJC</sub>	Junction to Case Thermal Resistance	Transistor		0.025	°C/W	
		Series diode		0.16		
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t = 1 min, I <sub>isol</sub> < 1mA, 50/60Hz	2500			V	
T <sub>J</sub>	Operating junction temperature 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	

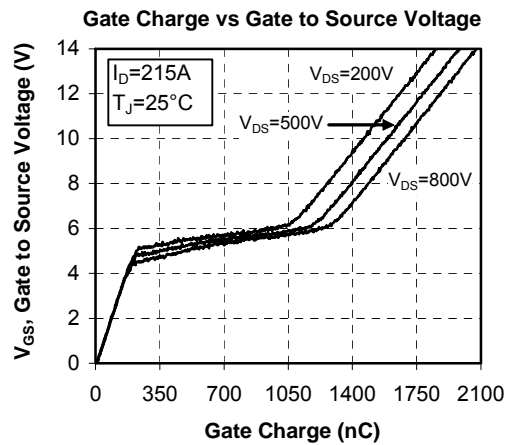
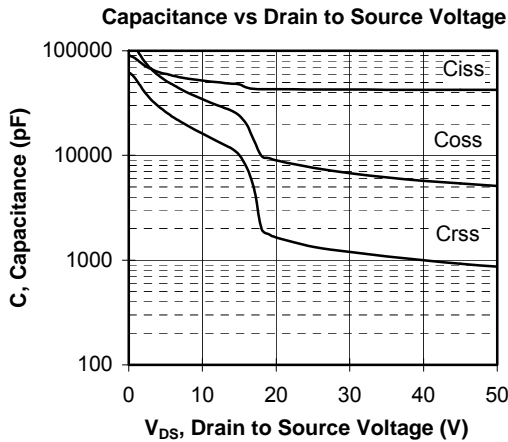
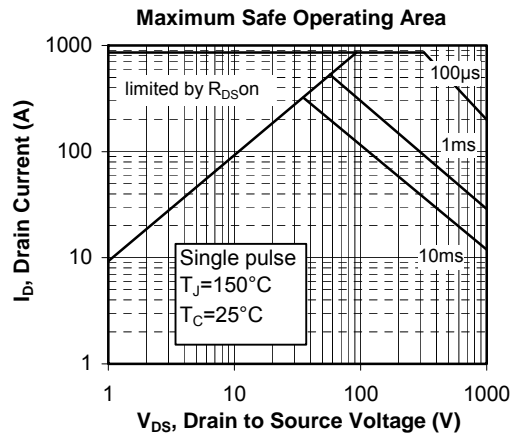
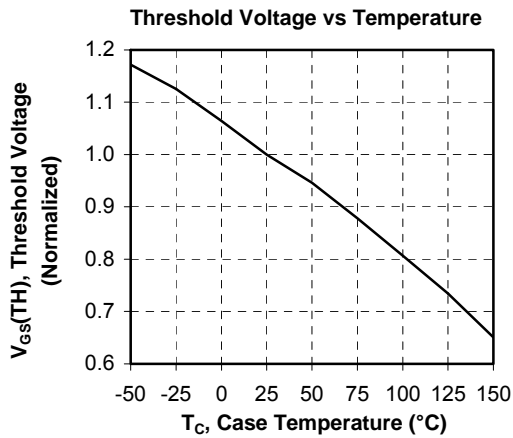
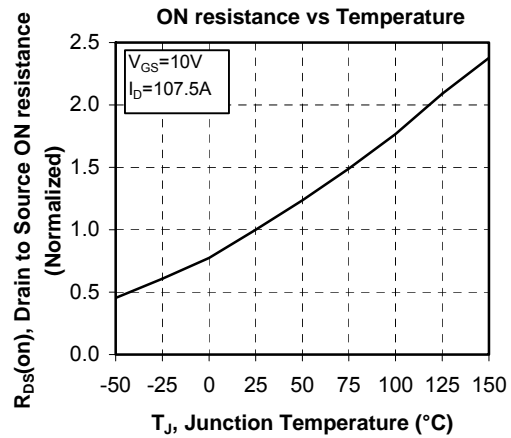
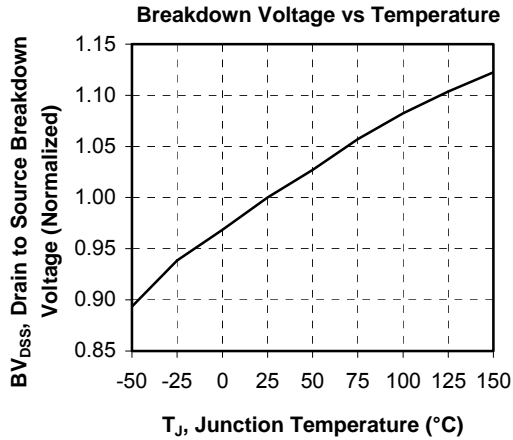
## SP6 Package outline (dimensions in mm)

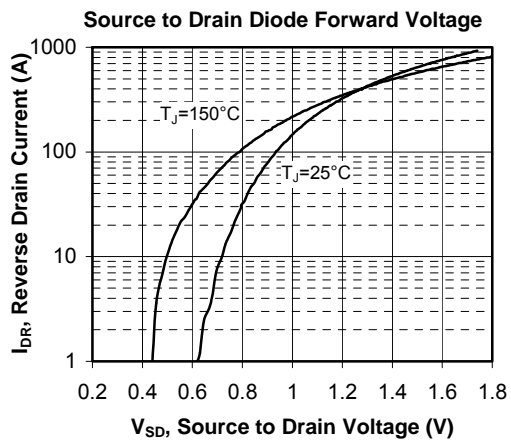
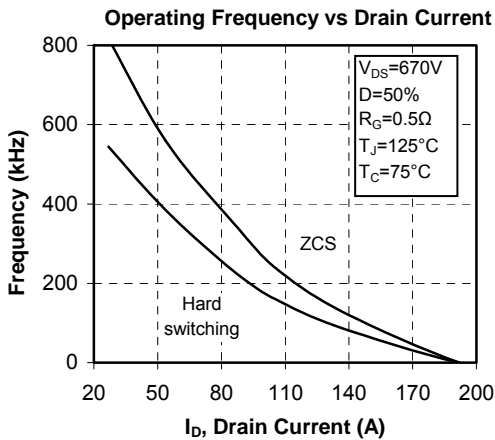
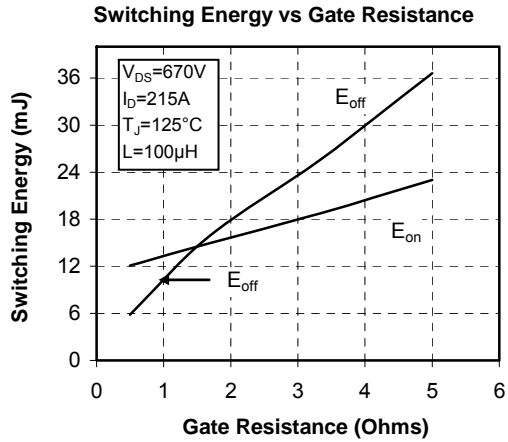
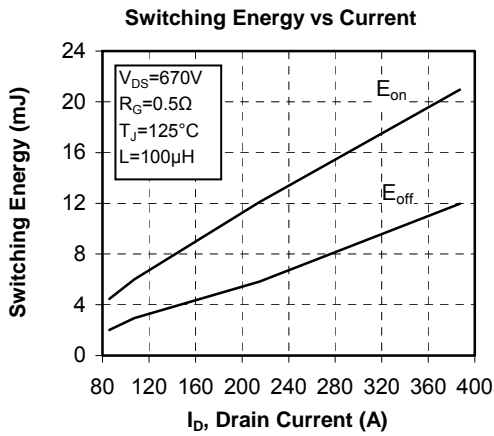
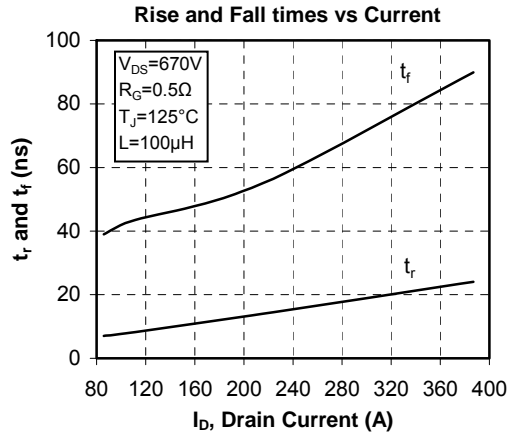
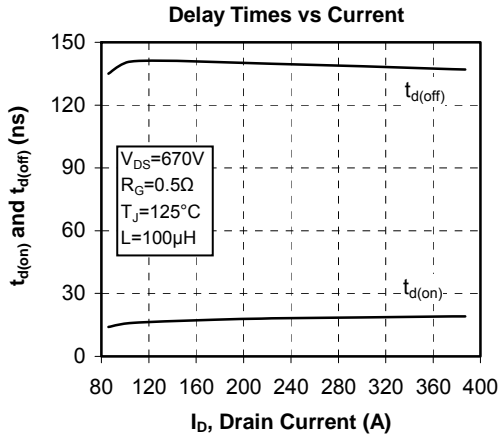


See application note APT0601 - Mounting Instructions for SP6 Power Modules on [www.microsemi.com](http://www.microsemi.com)

## Typical Performance Curve







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