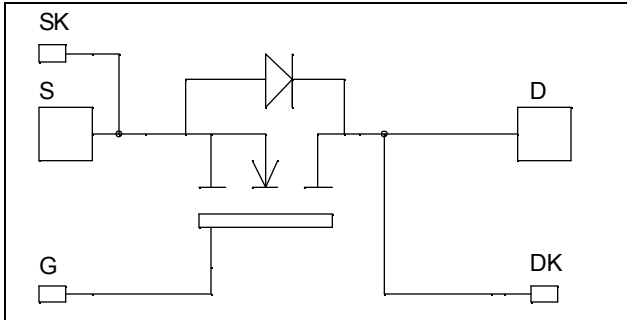


Single switch MOSFET Power Module

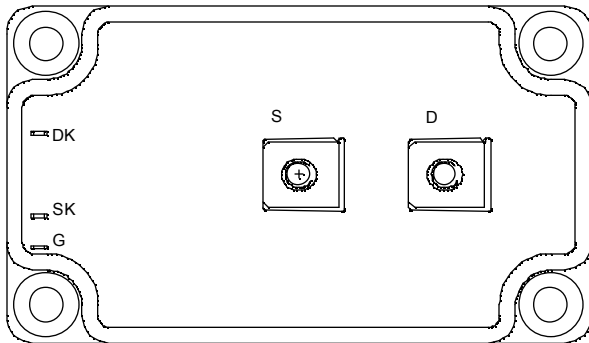
 $V_{DSS} = 1200V$
 $R_{DSon} = 70m\Omega \text{ typ @ } T_j = 25^\circ C$
 $I_D = 171A \text{ @ } T_c = 25^\circ C$


Application

- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

Features

- Power MOS 7[®] FREDFETs
 - Low R_{DSon}
 - Low input and Miller capacitance
 - Low gate charge
 - Fast intrinsic reverse diode
 - 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	1200	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	171
		$T_c = 80^\circ C$	126
I_{DM}	Pulsed Drain current	684	A
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	80	$m\Omega$
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	5000
I_{AR}	Avalanche current (repetitive and non repetitive)	24	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

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	$V_{GS} = 0\text{V}, V_{DS} = 1200\text{V}$			1.5	mA
		$V_{GS} = 0\text{V}, V_{DS} = 1000\text{V}$			6	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10\text{V}, I_D = 85.5\text{A}$		70	80	m Ω
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 30\text{mA}$	3		5	V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = \pm 30\text{V}, V_{DS} = 0\text{V}$			± 600	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0\text{V}$		43.5		nF
C_{oss}	Output Capacitance	$V_{DS} = 25\text{V}$		6.6		
C_{rss}	Reverse Transfer Capacitance	$f = 1\text{MHz}$		1.2		
Q_g	Total gate charge	$V_{GS} = 10\text{V}$		1650		nC
Q_{gs}	Gate – Source Charge	$V_{Bus} = 600\text{V}$		192		
Q_{gd}	Gate – Drain Charge	$I_D = 171\text{A}$		1074		
$T_{d(on)}$	Turn-on Delay Time	Inductive switching @ 125°C		20		ns
T_r	Rise Time	$V_{GS} = 15\text{V}$		17		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 800\text{V}$		245		
T_f	Fall Time	$I_D = 171\text{A}$ $R_G = 0.8\Omega$		62		
E_{on}	Turn-on Switching Energy	Inductive switching @ 25°C		7.6		mJ
E_{off}	Turn-off Switching Energy	$V_{GS} = 15\text{V}, V_{Bus} = 800\text{V}$ $I_D = 171\text{A}, R_G = 0.8\Omega$		6.9		
E_{on}	Turn-on Switching Energy	Inductive switching @ 125°C		13.8		mJ
E_{off}	Turn-off Switching Energy	$V_{GS} = 15\text{V}, V_{Bus} = 800\text{V}$ $I_D = 171\text{A}, R_G = 0.8\Omega$		8.5		

Source - Drain diode ratings and characteristics

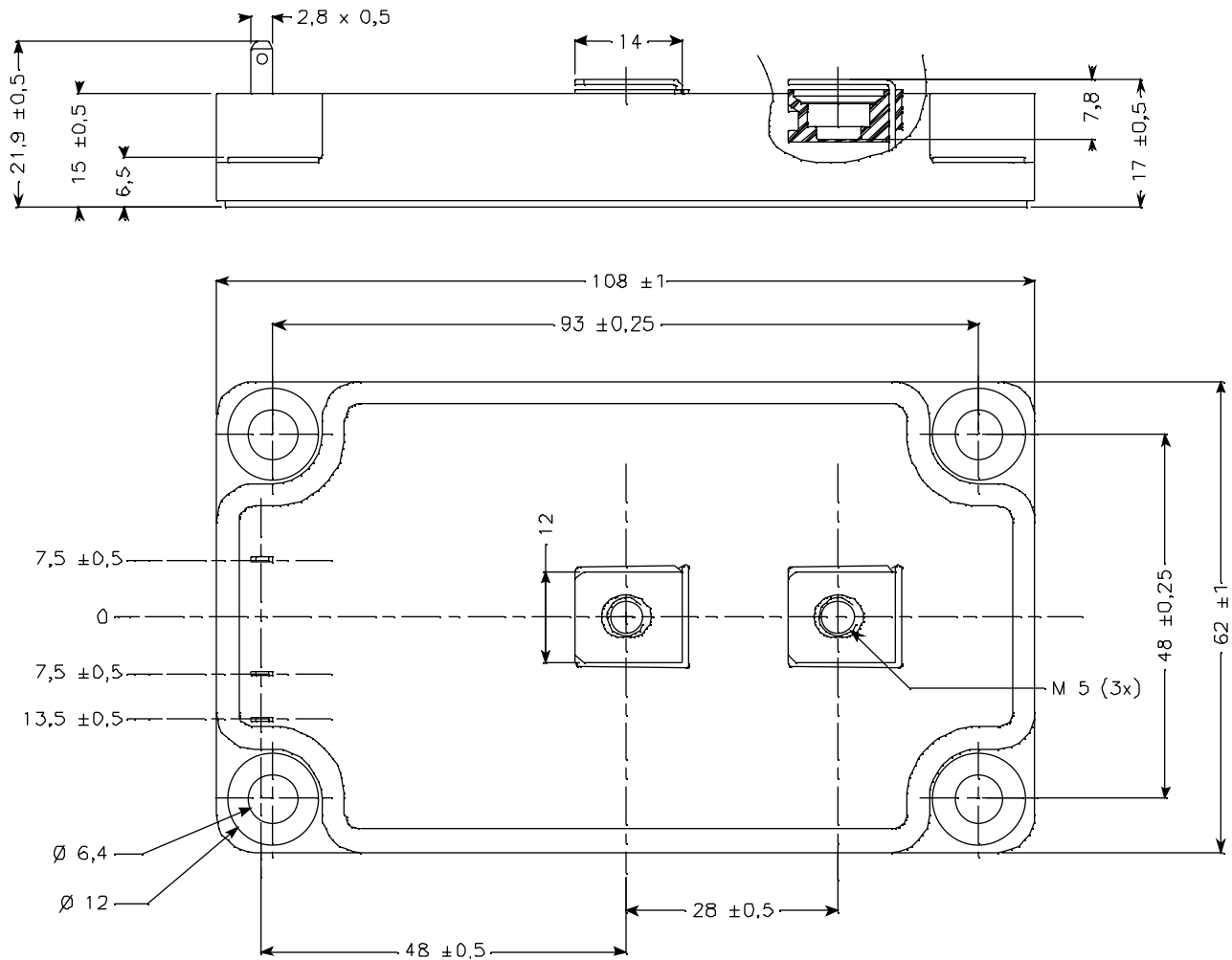
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit	
I_S	Continuous Source current (Body diode)	$T_c = 25^\circ\text{C}$			171	A	
		$T_c = 80^\circ\text{C}$			126		
V_{SD}	Diode Forward Voltage	$V_{GS} = 0\text{V}, I_S = -171\text{A}$			1.3	V	
dv/dt	Peak Diode Recovery ①				18	V/ns	
t_{rr}	Reverse Recovery Time	$I_S = -171\text{A}$ $V_R = 600\text{V}$ $di_s/dt = 600\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$			375	ns
			$T_j = 125^\circ\text{C}$			860	
Q_{rr}	Reverse Recovery Charge	$I_S = -171\text{A}$ $V_R = 600\text{V}$ $di_s/dt = 600\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$		12	μC	
			$T_j = 125^\circ\text{C}$		54		

 ① dv/dt numbers reflect the limitations of the circuit rather than the device itself.

$$I_S \leq -171\text{A} \quad di/dt \leq 700\text{A}/\mu\text{s} \quad V_R \leq V_{DSS} \quad T_j \leq 150^\circ\text{C}$$

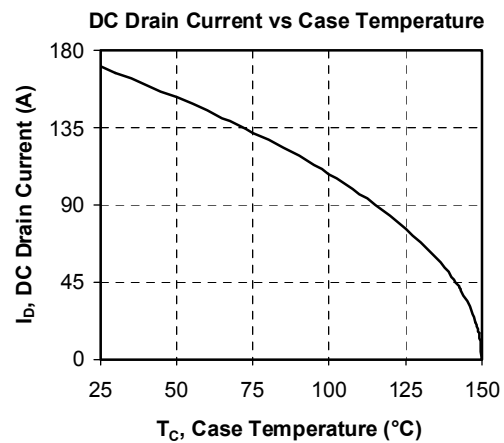
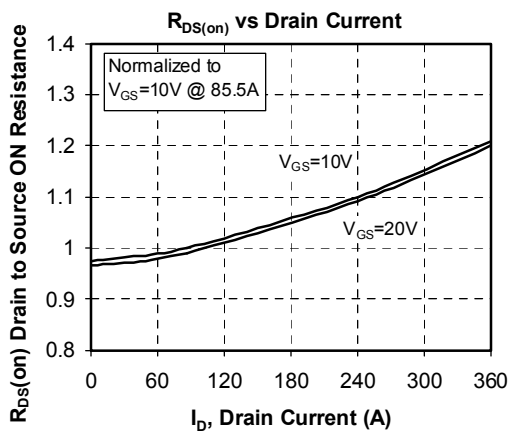
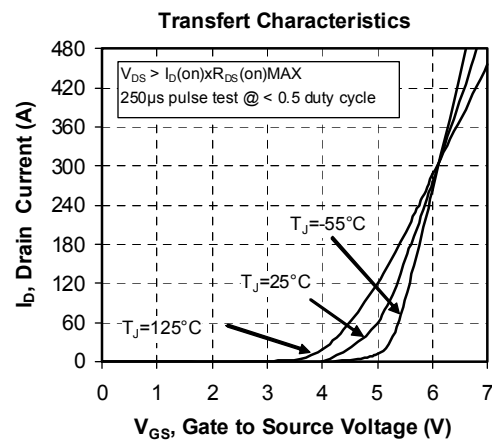
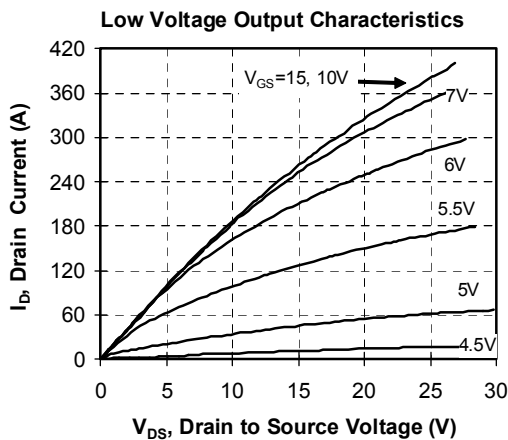
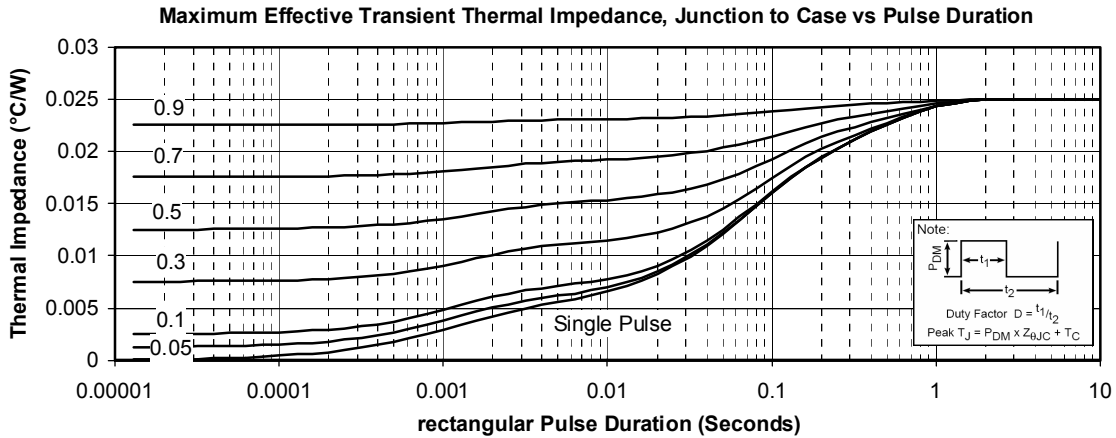
Thermal and package characteristics

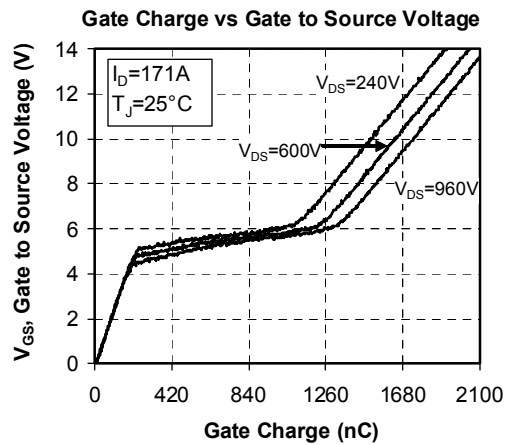
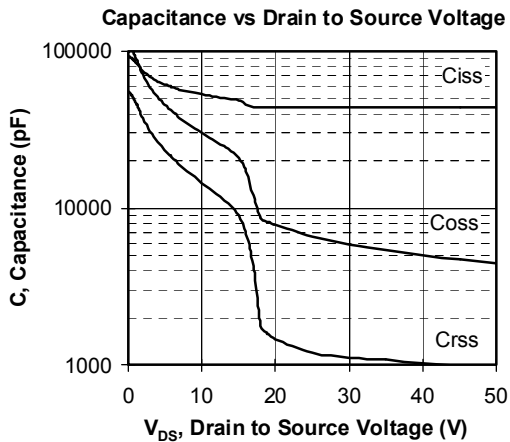
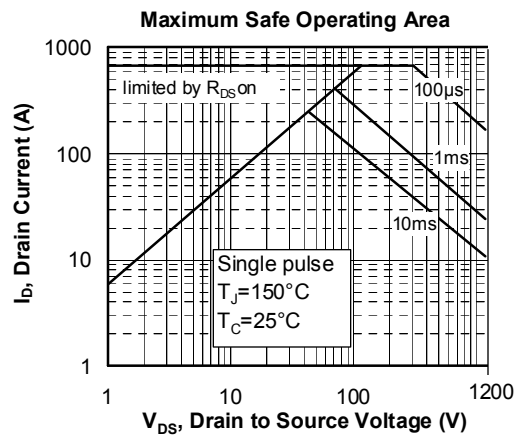
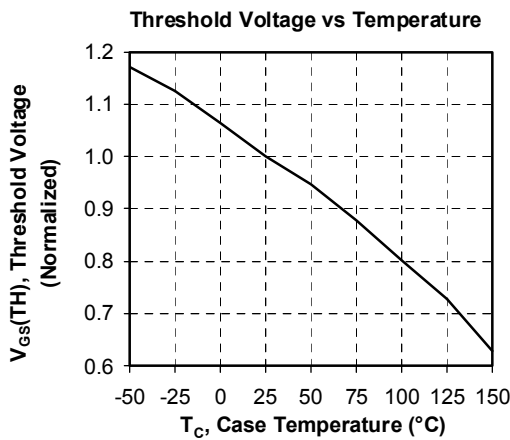
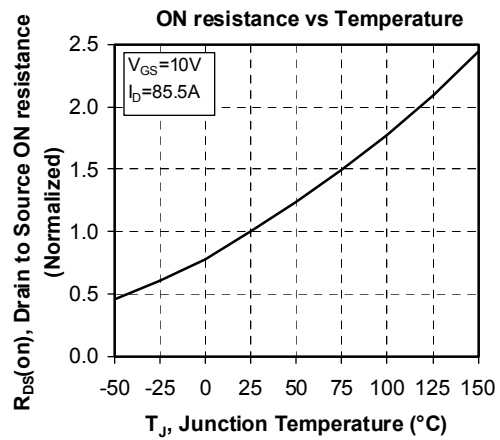
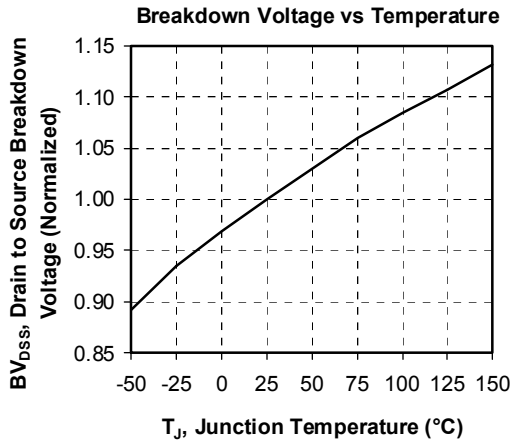
Symbol	Characteristic	Min	Typ	Max	Unit	
R_{thJC}	Junction to Case Thermal Resistance			0.025	°C/W	
V_{ISOL}	RMS Isolation Voltage, any terminal to case t = 1 min, I _{isol} < 1mA, 50/60Hz	2500			V	
T_J	Operating junction temperature range	-40		150	°C	
T_{STG}	Storage Temperature Range	-40		125		
T_C	Operating Case Temperature	-40		100		
Torque	Mounting torque	To heatsink	M6	3	5	N.m
		For terminals	M5	2	3.5	
Wt	Package Weight			280	g	

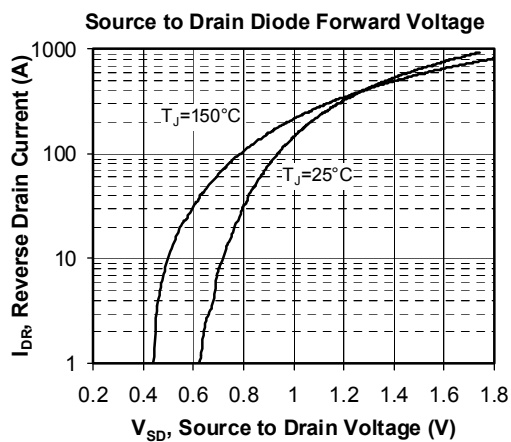
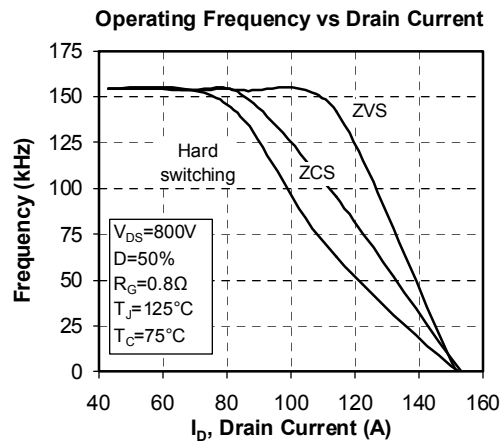
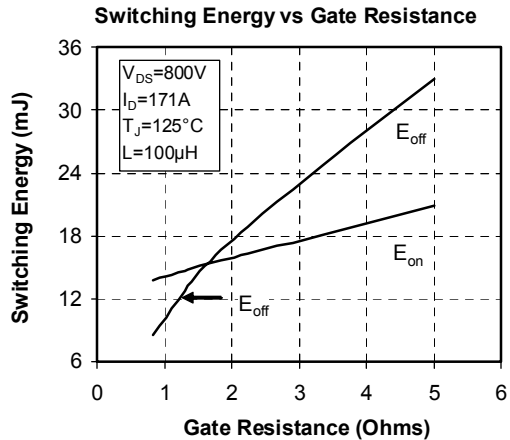
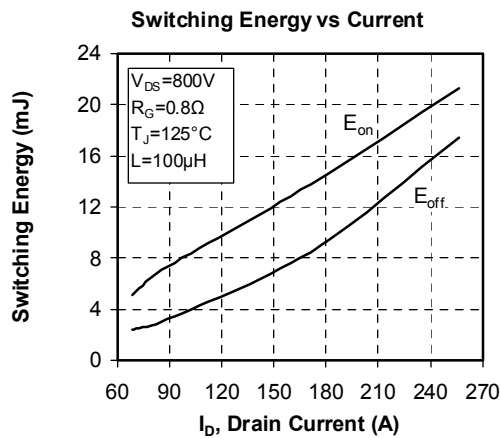
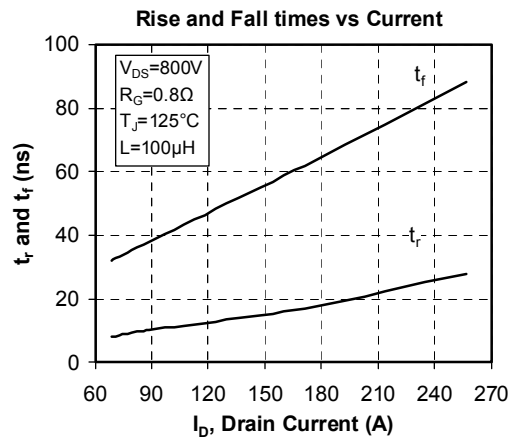
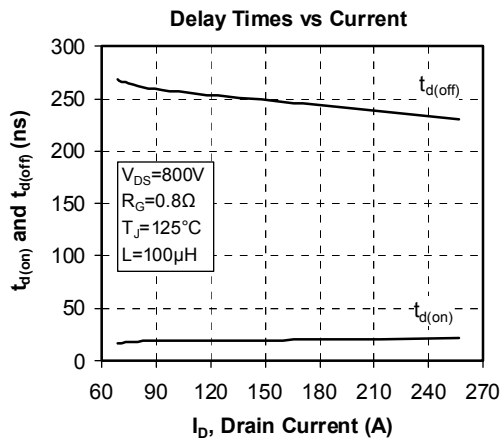
SP6 Package outline (dimensions in mm)


See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com

Typical Performance Curve







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