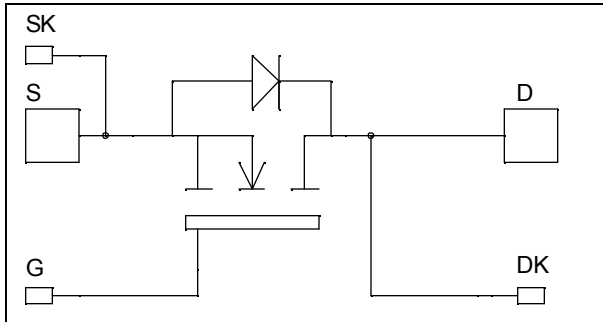


Single Switch MOSFET Power Module

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

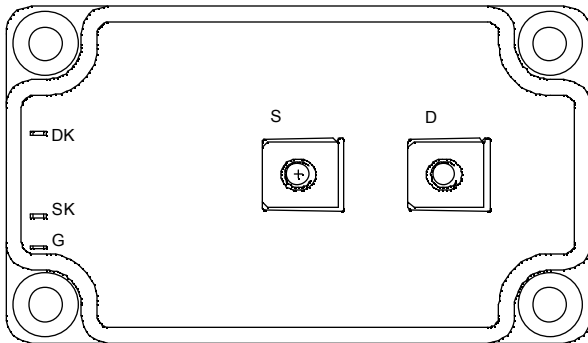


Application

- 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	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	± 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	

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	$V_{GS} = 0\text{V}, V_{DS} = 1000\text{V}$ $T_j = 25^\circ\text{C}$			600	μA
		$V_{GS} = 0\text{V}, V_{DS} = 800\text{V}$ $T_j = 125^\circ\text{C}$			3	mA
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10\text{V}, I_D = 107.5\text{A}$		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	$V_{GS} = \pm 30\text{V}, V_{DS} = 0\text{V}$			± 600	nA

Dynamic Characteristics

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

Source - Drain diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_S	Continuous Source current (Body diode)		$T_c = 25^\circ\text{C}$		215	A
			$T_c = 80^\circ\text{C}$		160	
V_{SD}	Diode Forward Voltage	$V_{GS} = 0\text{V}, I_S = -215\text{A}$			1.3	V
dv/dt	Peak Diode Recovery ❶				18	V/ns
t_{rr}	Reverse Recovery Time	$I_S = -215\text{A}$ $V_R = 670\text{V}$ $di/dt = 600\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$		310	ns
			$T_j = 125^\circ\text{C}$		625	
Q_{rr}	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$	12		μC
			$T_j = 125^\circ\text{C}$	36		

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

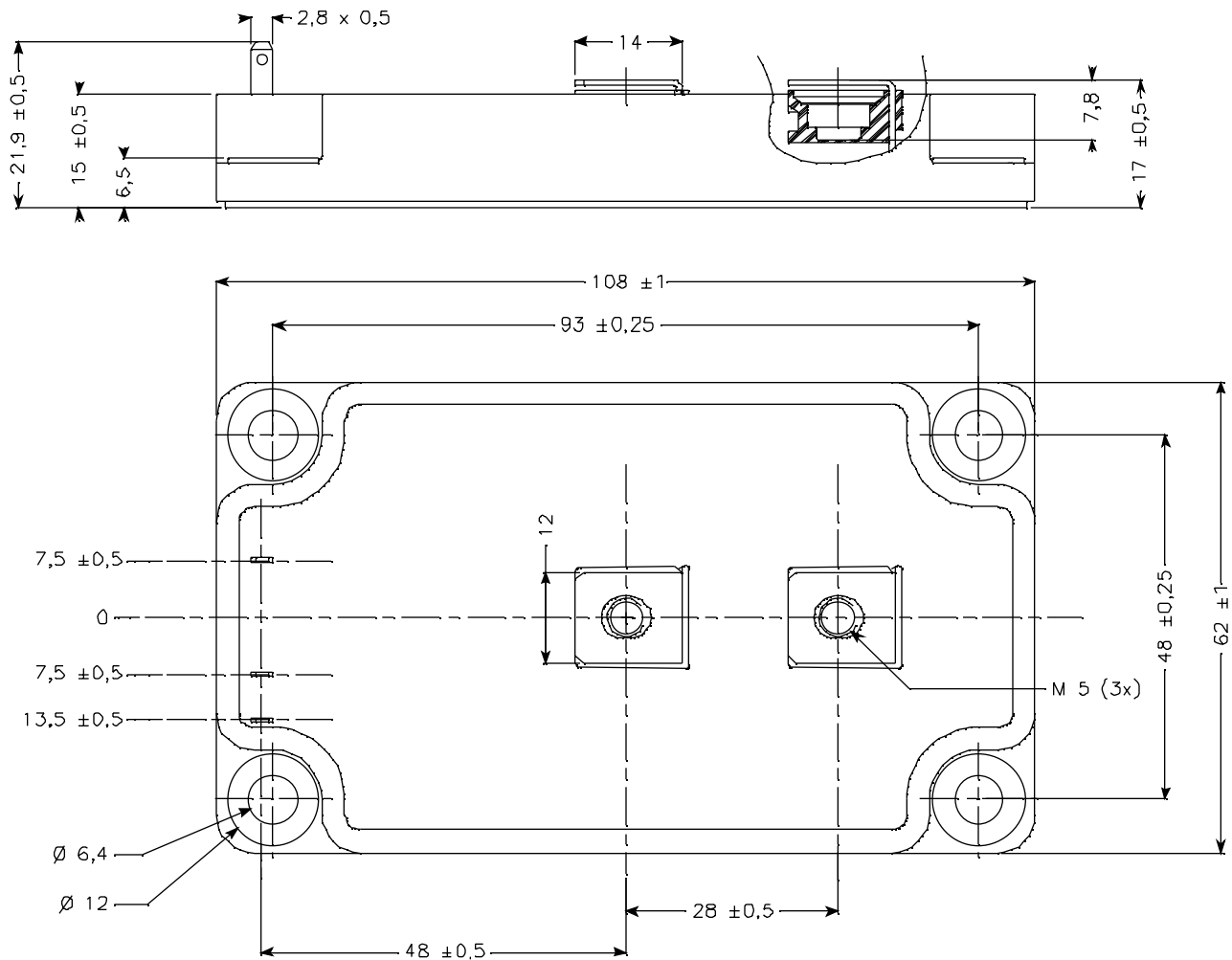
$$I_S \leq -215\text{A} \quad di/dt \leq 700\text{A}/\mu\text{s} \quad V_R \leq V_{DSS} \quad T_j \leq 150^\circ\text{C}$$

Thermal and package characteristics

Symbol Characteristic

		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	
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	

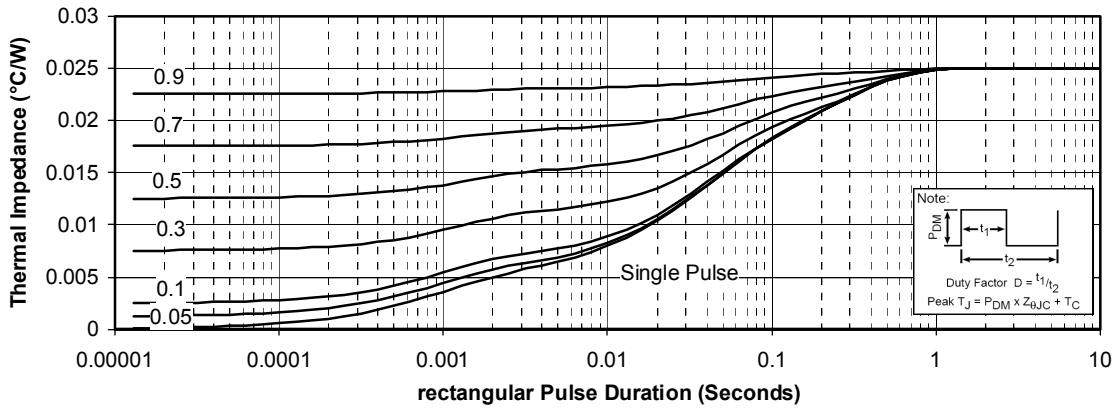
SP6 Package outline (dimensions in mm)



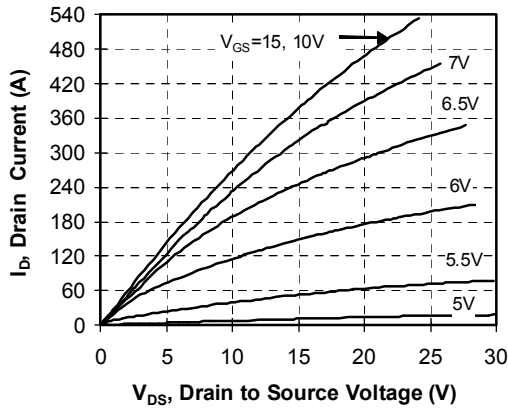
See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com

Typical Performance Curve

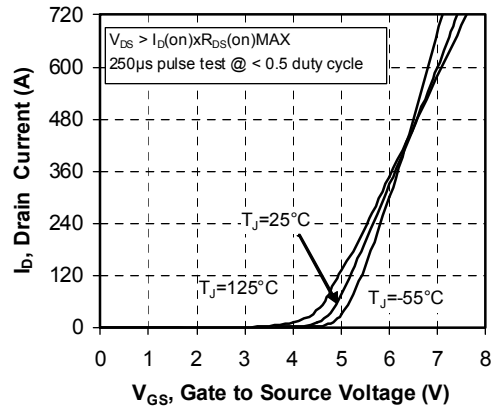
Maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration



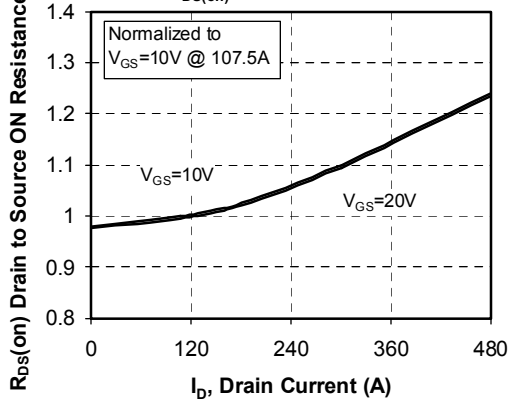
Low Voltage Output Characteristics



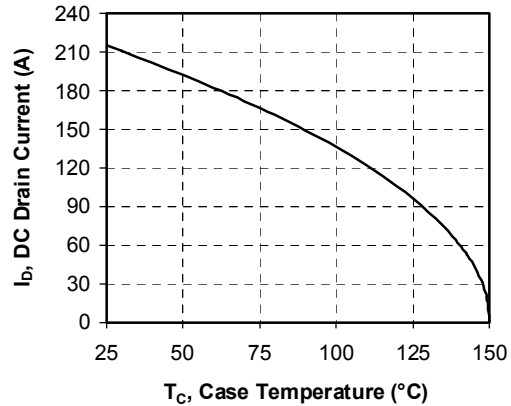
Transfer Characteristics

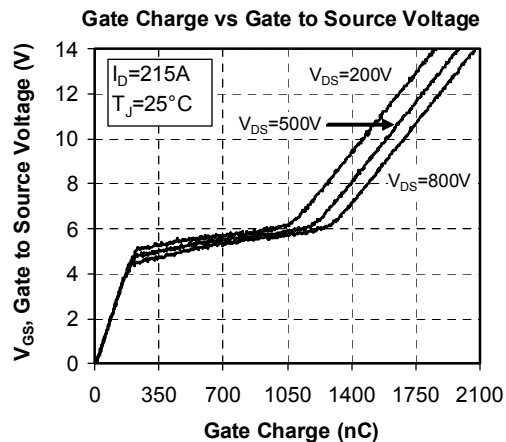
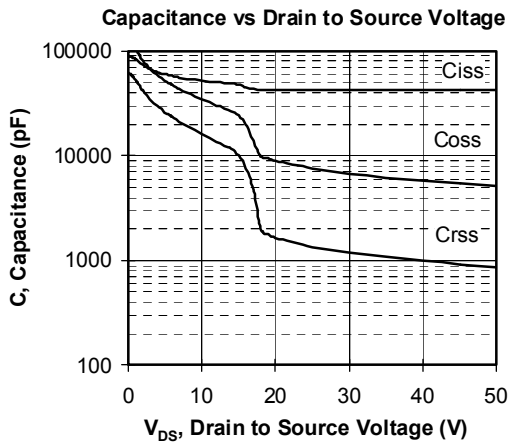
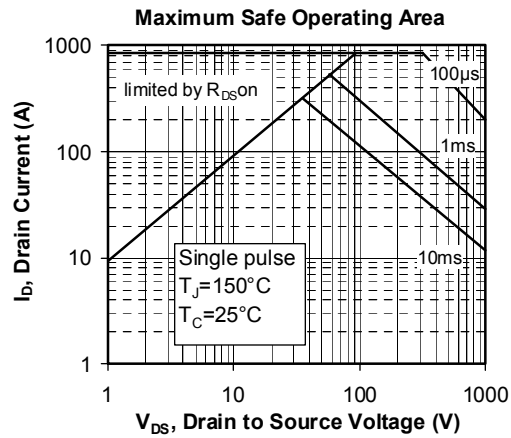
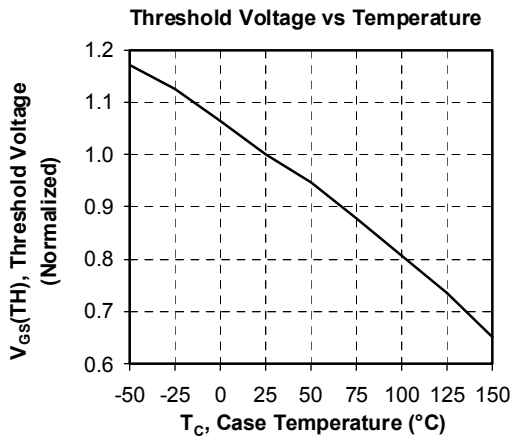
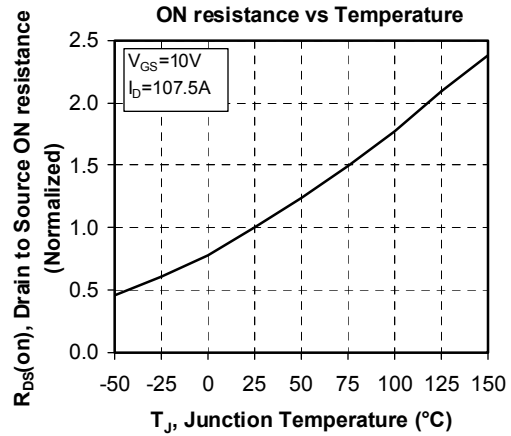
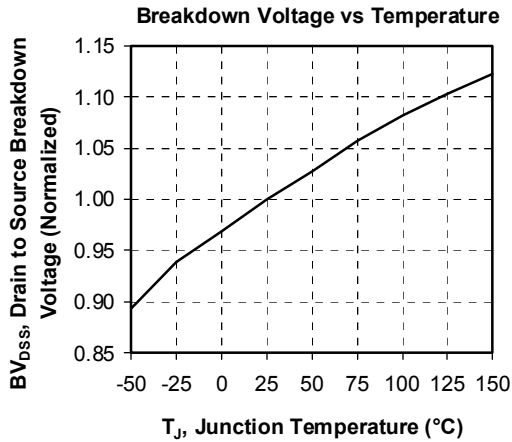


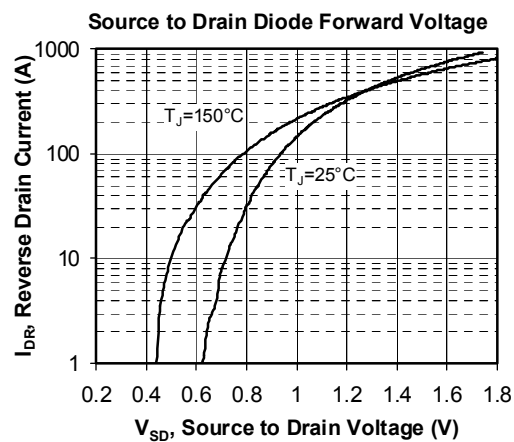
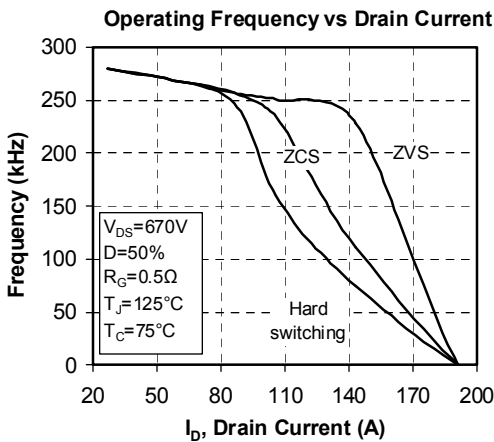
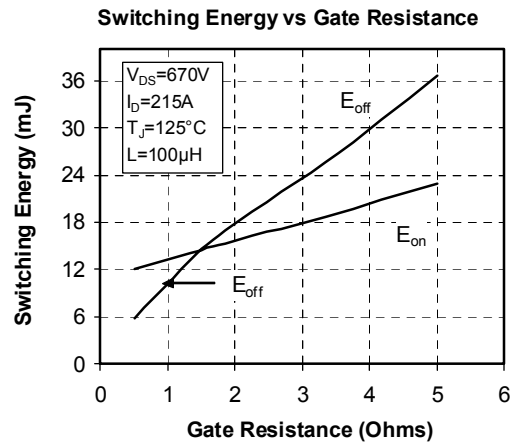
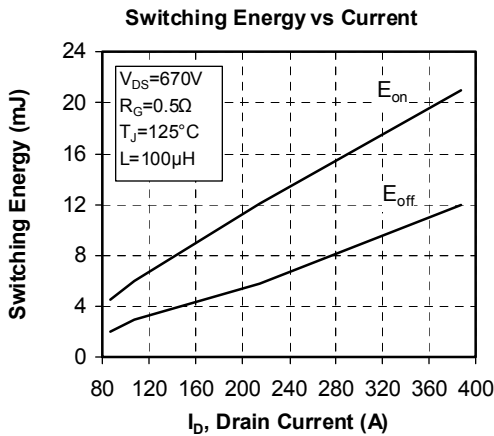
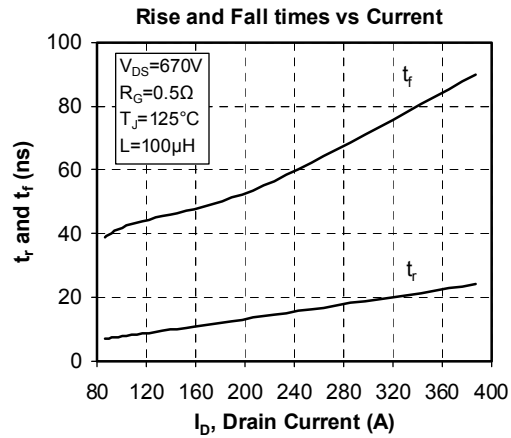
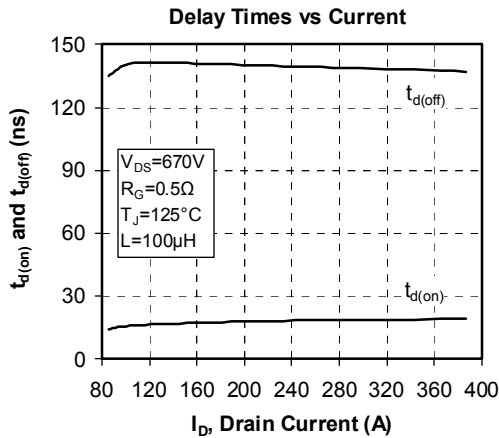
$R_{DS(on)}$ vs Drain Current



DC Drain Current vs Case Temperature







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