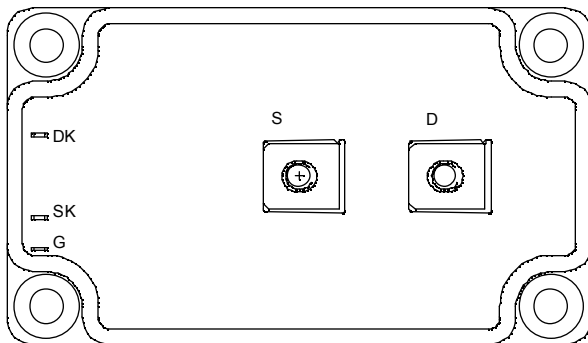
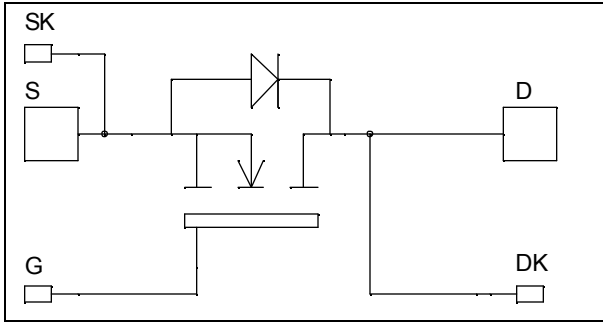


Single Switch MOSFET Power Module

$V_{DSS} = 500V$
 $R_{DSon} = 9\ m\Omega\ \text{typ}\ @\ T_j = 25^\circ C$
 $I_D = 497A\ @\ T_c = 25^\circ C$



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	500	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	497
		$T_c = 80^\circ C$	371
I_{DM}	Pulsed Drain current	1988	A
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	10	m Ω
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	5000
I_{AR}	Avalanche current (repetitive and non repetitive)	71	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

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	$V_{GS} = 0\text{V}, V_{DS} = 500\text{V}$			600	μA
		$V_{GS} = 0\text{V}, V_{DS} = 400\text{V}$			3000	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10\text{V}, I_D = 248.5\text{A}$		9	10	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 30\text{mA}$	3		5	V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = \pm 30\text{V}, V_{DS} = 0\text{V}$			± 450	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0\text{V}$		63.3		nF
C_{oss}	Output Capacitance	$V_{DS} = 25\text{V}$		12.4		
C_{rss}	Reverse Transfer Capacitance	$f = 1\text{MHz}$		0.63		
Q_g	Total gate Charge	$V_{GS} = 10\text{V}$		1200		nC
Q_{gs}	Gate – Source Charge	$V_{Bus} = 250\text{V}$		300		
Q_{gd}	Gate – Drain Charge	$I_D = 497\text{A}$		630		
$T_{d(on)}$	Turn-on Delay Time	Inductive switching @ 125°C $V_{GS} = 15\text{V}$ $V_{Bus} = 333\text{V}$ $I_D = 497\text{A}$ $R_G = 0.5\Omega$		21		ns
T_r	Rise Time			42		
$T_{d(off)}$	Turn-off Delay Time			96		
T_f	Fall Time			100		
E_{on}	Turn-on Switching Energy	Inductive switching @ 25°C $V_{GS} = 15\text{V}, V_{Bus} = 333\text{V}$ $I_D = 497\text{A}, R_G = 0.5\Omega$		6		mJ
E_{off}	Turn-off Switching Energy			6.2		
E_{on}	Turn-on Switching Energy	Inductive switching @ 125°C $V_{GS} = 15\text{V}, V_{Bus} = 333\text{V}$ $I_D = 497\text{A}, R_G = 0.5\Omega$		9.48		mJ
E_{off}	Turn-off Switching Energy			6.96		

Source - Drain diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit	
I_S	Continuous Source current (Body diode)	$T_c = 25^\circ\text{C}$			497	A	
		$T_c = 80^\circ\text{C}$			371		
V_{SD}	Diode Forward Voltage	$V_{GS} = 0\text{V}, I_S = -497\text{A}$			1.3	V	
dv/dt	Peak Diode Recovery ①				18	V/ns	
t_{rr}	Reverse Recovery Time	$I_S = -497\text{A}$ $V_R = 333\text{V}$ $di/dt = 600\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$			300	ns
			$T_j = 125^\circ\text{C}$			600	
Q_{rr}	Reverse Recovery Charge	$I_S = -497\text{A}$ $V_R = 333\text{V}$ $di/dt = 600\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$		15.6	μC	
			$T_j = 125^\circ\text{C}$		60		

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

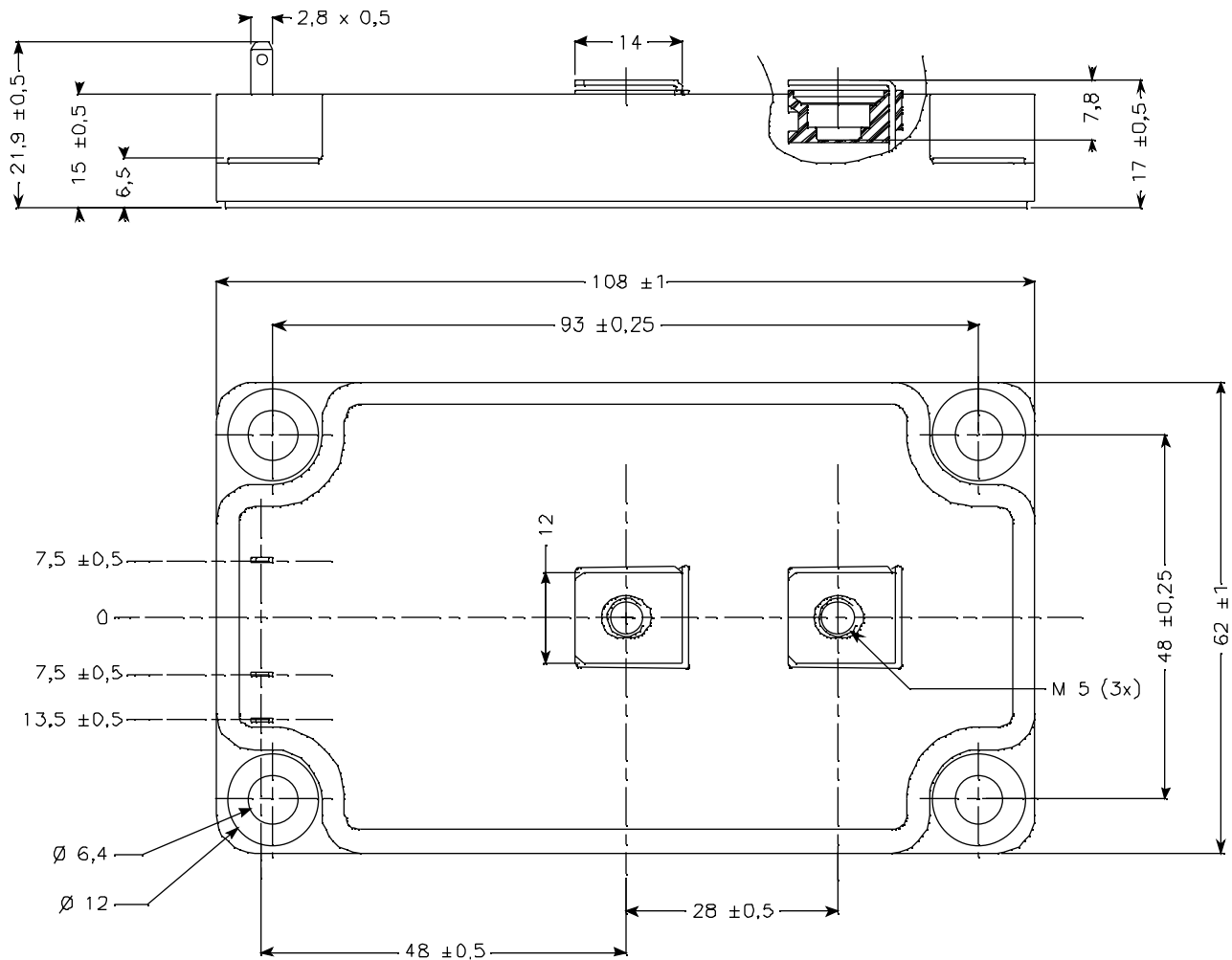
$$I_S \leq -497\text{A} \quad di/dt \leq 700\text{A}/\mu\text{s} \quad V_R \leq V_{DSS} \quad T_j \leq 150^\circ\text{C}$$

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, $I_{isol}<1$ mA, 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	

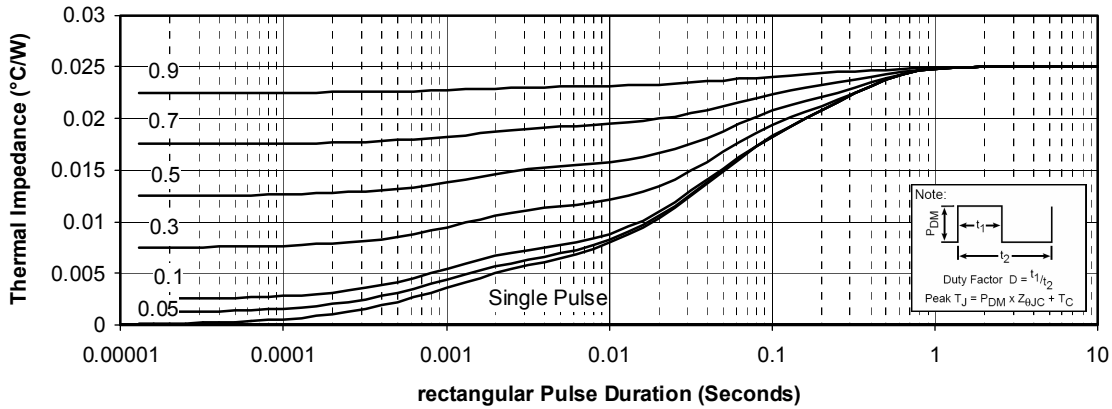
SP6 Package outline (dimensions in mm)



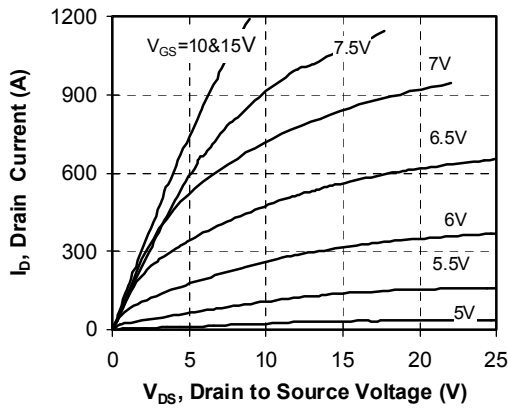
See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com

Typical Performance Curve

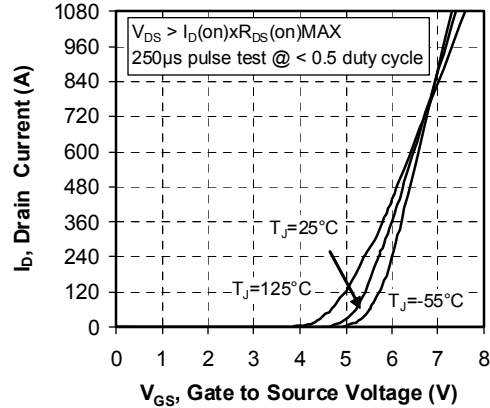
Maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration



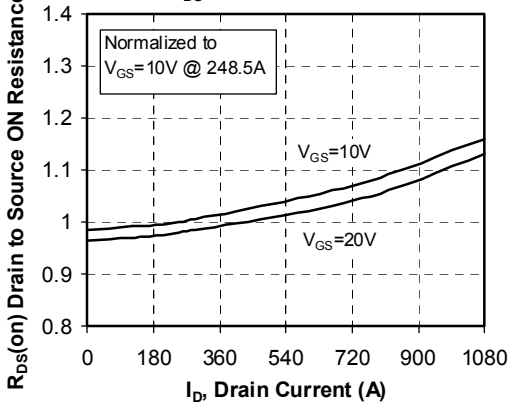
Low Voltage Output Characteristics



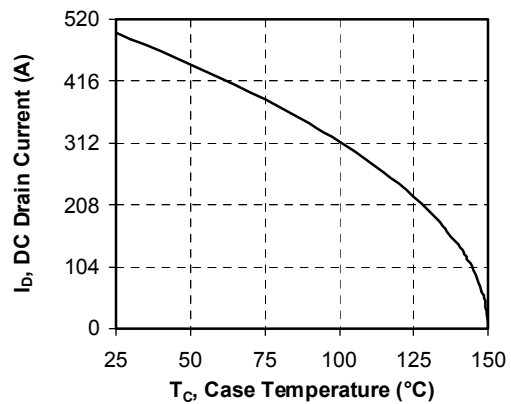
Transfer Characteristics

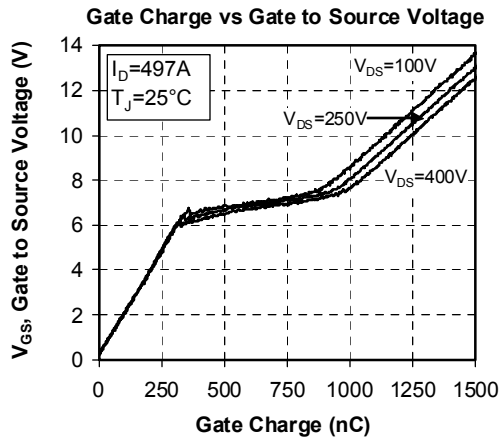
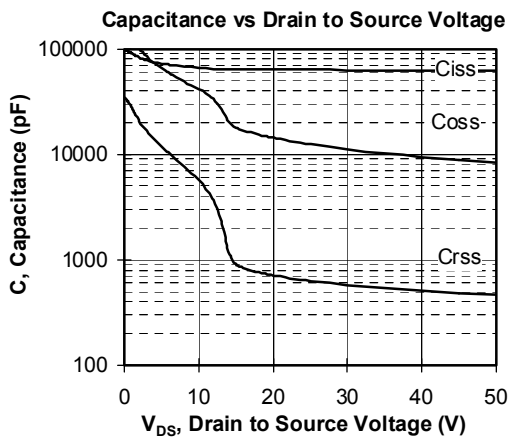
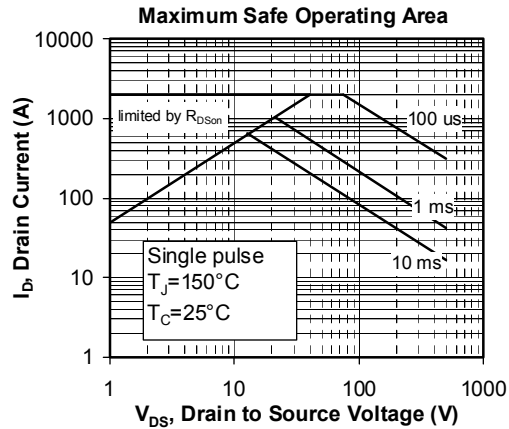
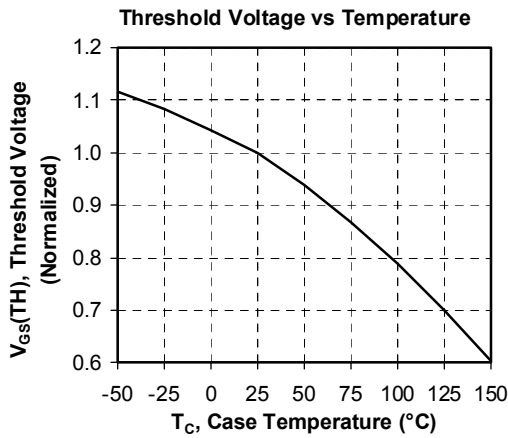
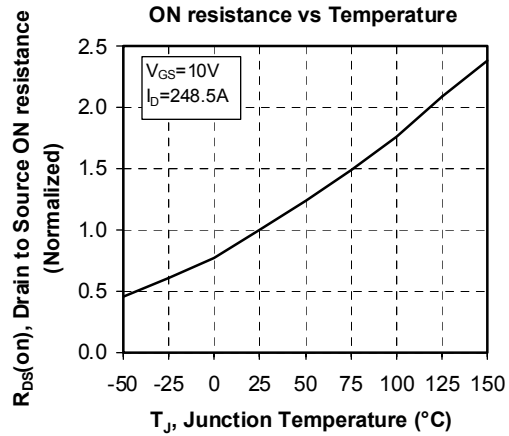
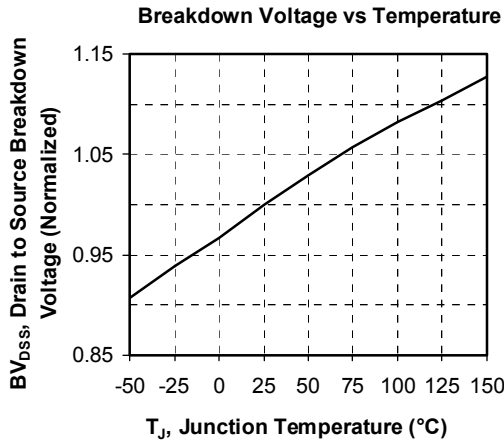


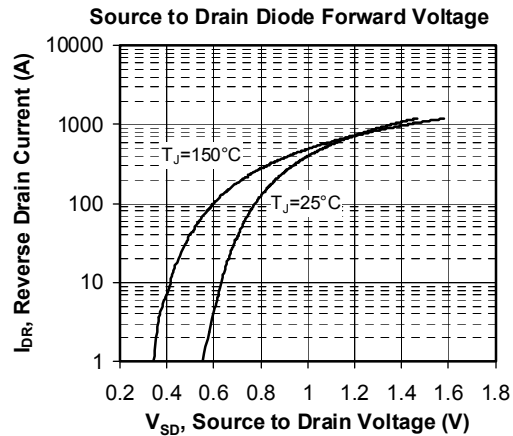
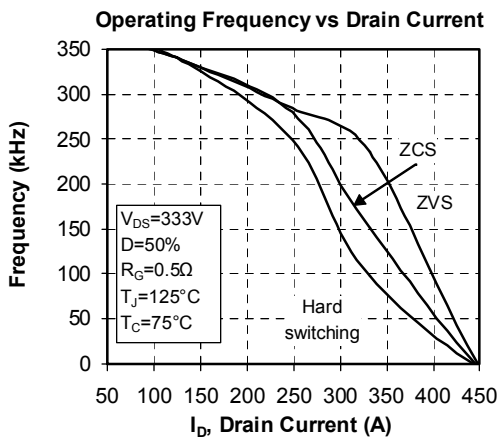
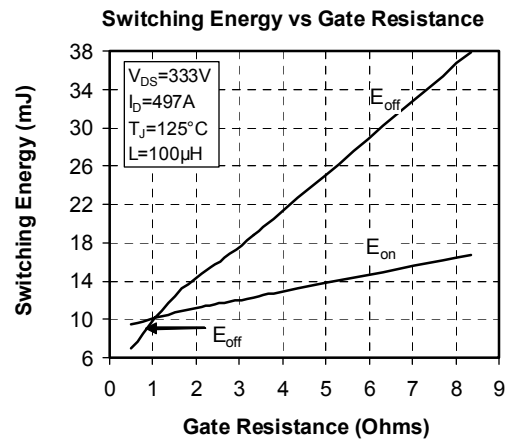
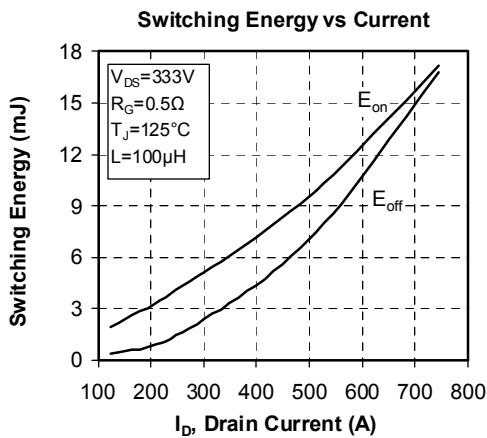
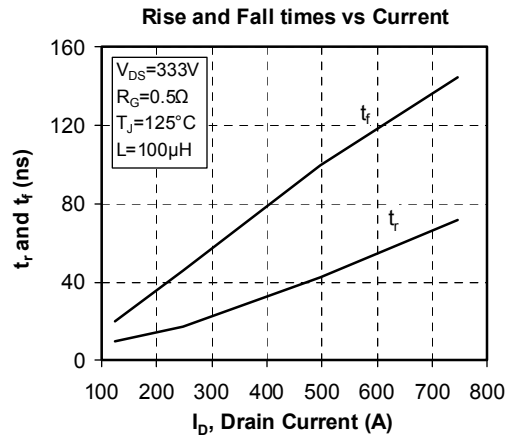
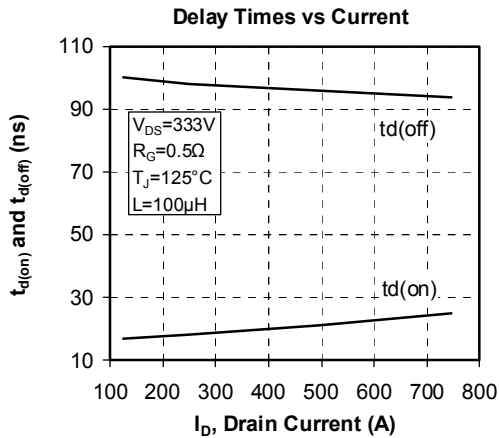
R_{DS(on)} vs Drain Current



DC Drain Current vs Case Temperature







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