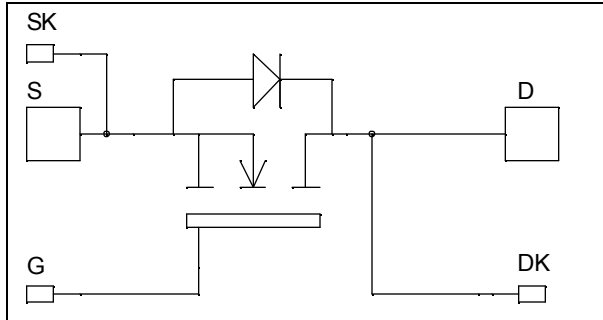


## Single Switch MOSFET Power Module

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



### Application

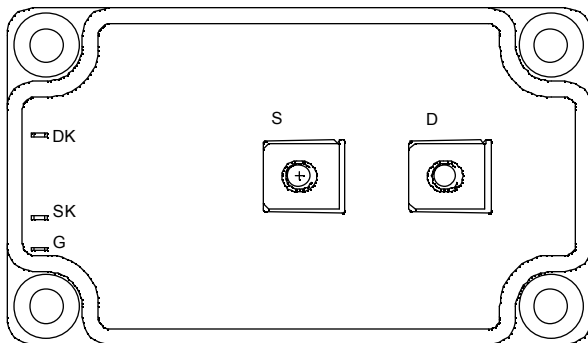
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

### Features

- Power MOS 7<sup>®</sup> 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	$\pm 30$	V
$R_{DSon}$	Drain - Source ON Resistance	10	$m\Omega$
$P_D$	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](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	$V_{GS} = 0\text{V}, V_{DS} = 500\text{V}$			600	$\mu\text{A}$
		$V_{GS} = 0\text{V}, V_{DS} = 400\text{V}$			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	$V_{GS} = \pm 30\text{V}, V_{DS} = 0\text{V}$			$\pm 450$	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	<b>Inductive switching @ <math>125^\circ\text{C}</math></b> $V_{GS} = 15\text{V}$ $V_{Bus} = 333\text{V}$ $I_D = 497\text{A}$ $R_G = 0.5\Omega$		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	<b>Inductive switching @ <math>25^\circ\text{C}</math></b> $V_{GS} = 15\text{V}, V_{Bus} = 333\text{V}$ $I_D = 497\text{A}, R_G = 0.5\Omega$		6		mJ
$E_{off}$	Turn-off Switching Energy			6.2		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ <math>125^\circ\text{C}</math></b> $V_{GS} = 15\text{V}, V_{Bus} = 333\text{V}$ $I_D = 497\text{A}, R_G = 0.5\Omega$		9.48		mJ
$E_{off}$	Turn-off Switching Energy			6.96		

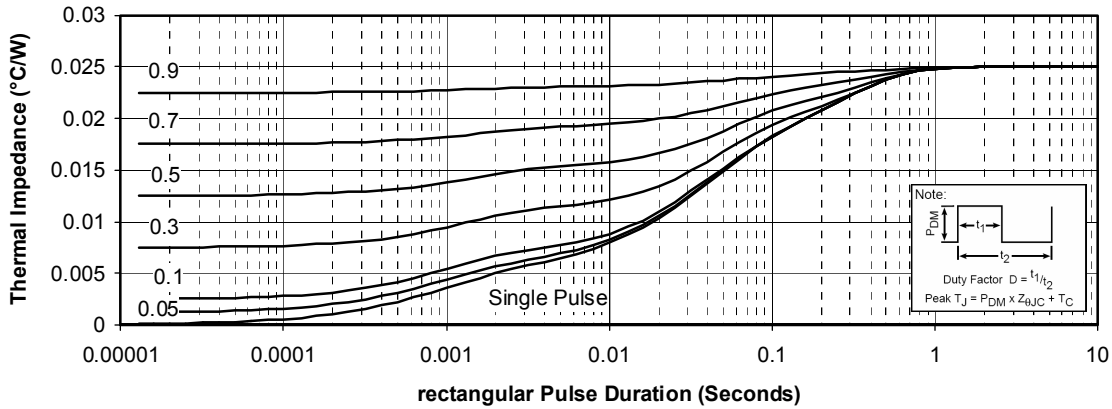
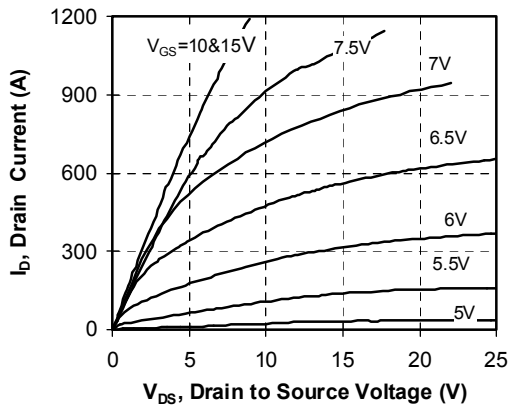
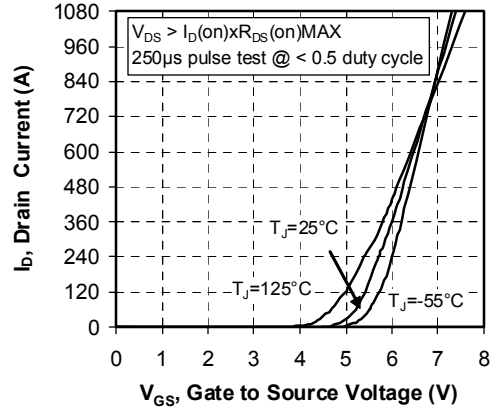
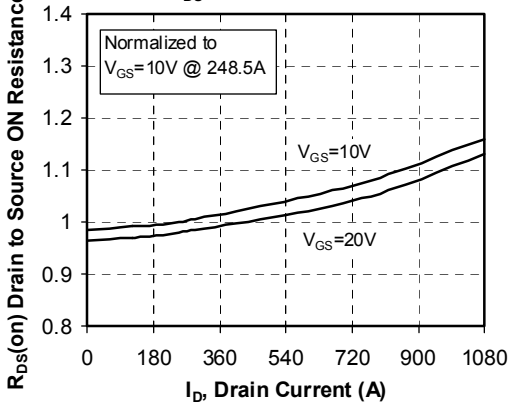
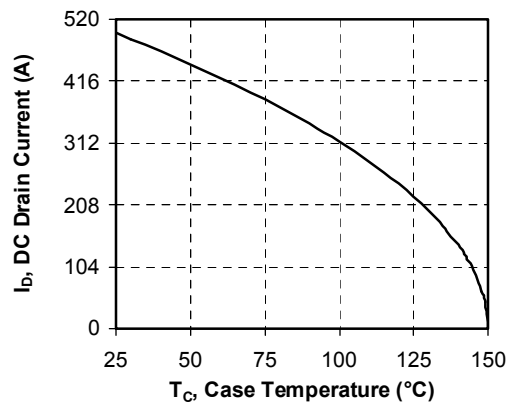
**Source - Drain diode ratings and characteristics**

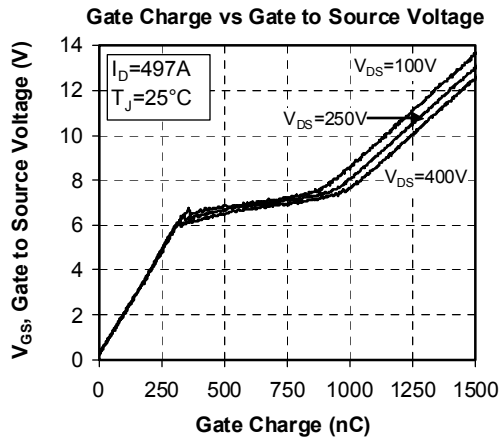
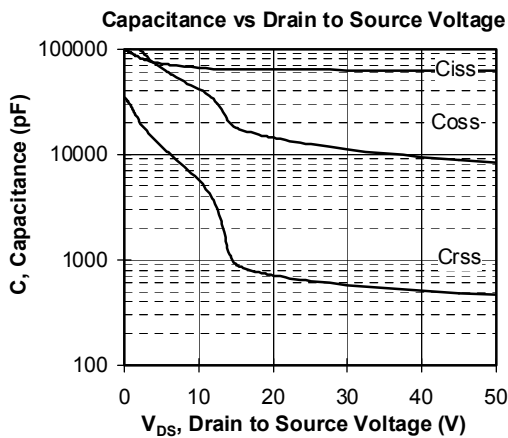
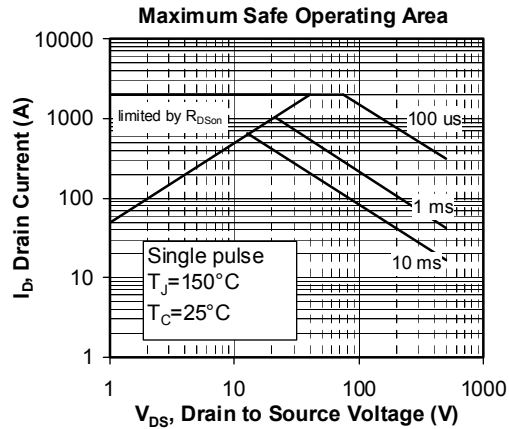
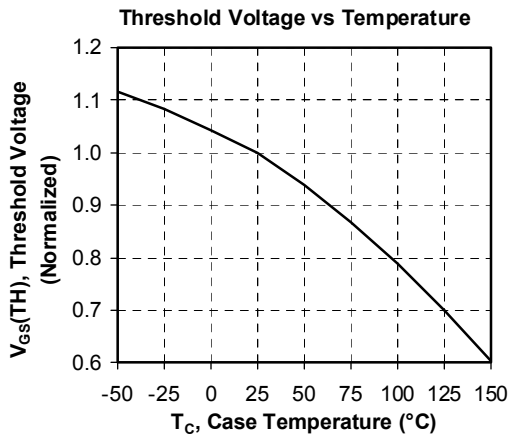
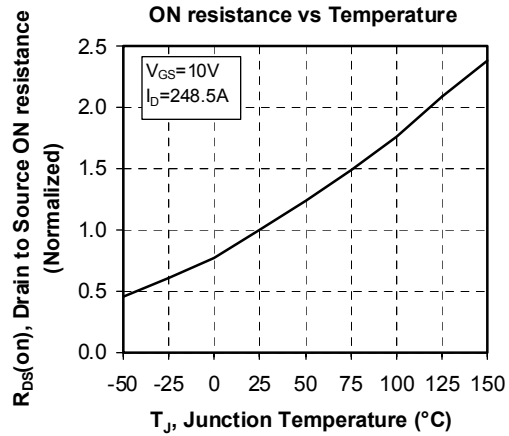
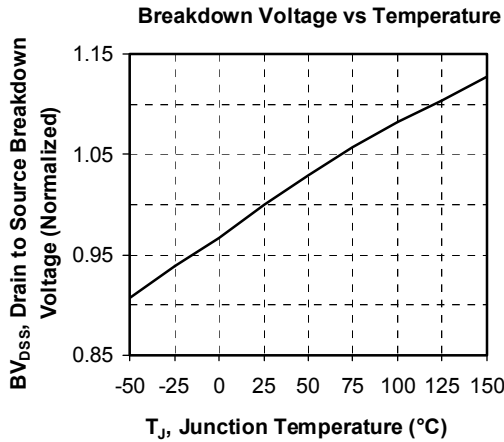
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit	
$I_S$	Continuous Source current (Body diode)	$T_c = 25^\circ\text{C}$			497	A	
		$T_c = 80^\circ\text{C}$			371		
$V_{SD}$	Diode Forward Voltage	$V_{GS} = 0\text{V}, I_S = -497\text{A}$			1.3	V	
$dv/dt$	Peak Diode Recovery ①				18	V/ns	
$t_{rr}$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

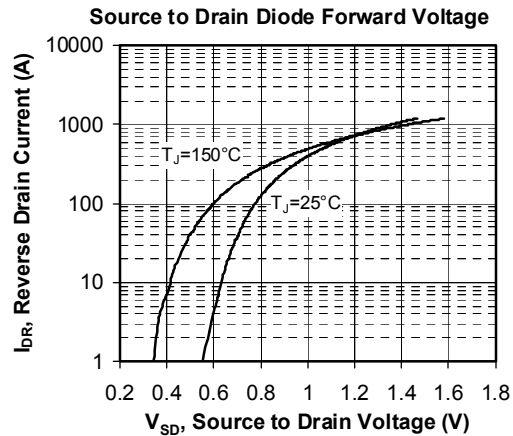
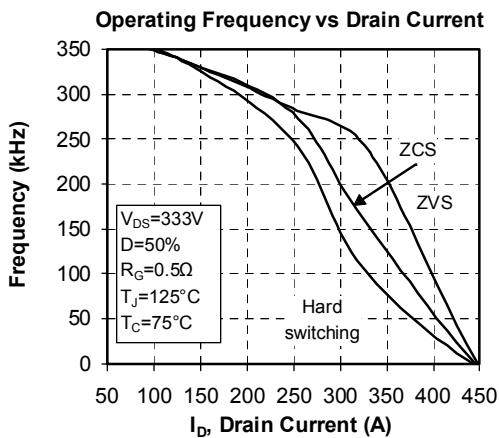
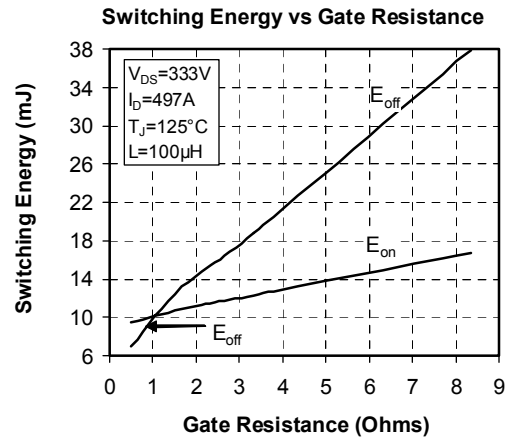
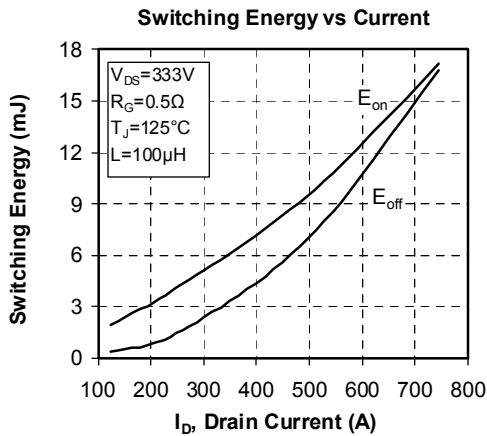
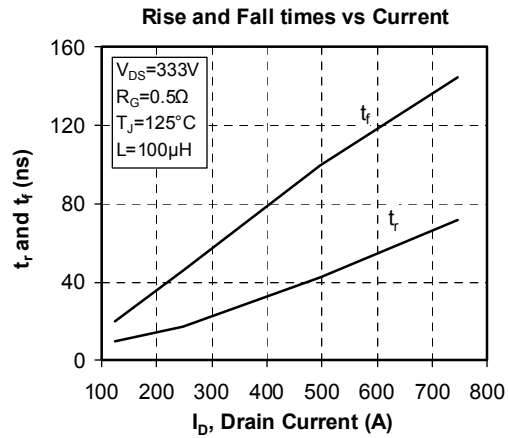
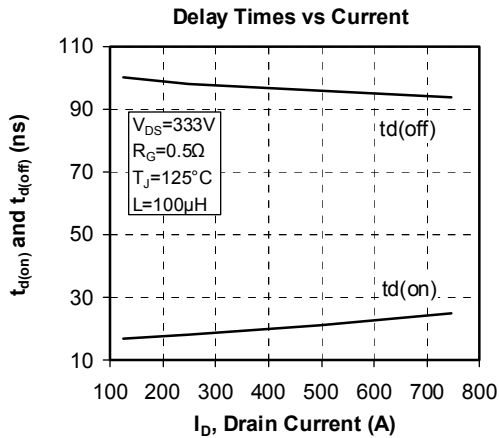
 ①  $dv/dt$  numbers reflect the limitations of the circuit rather than the device itself.

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



**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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