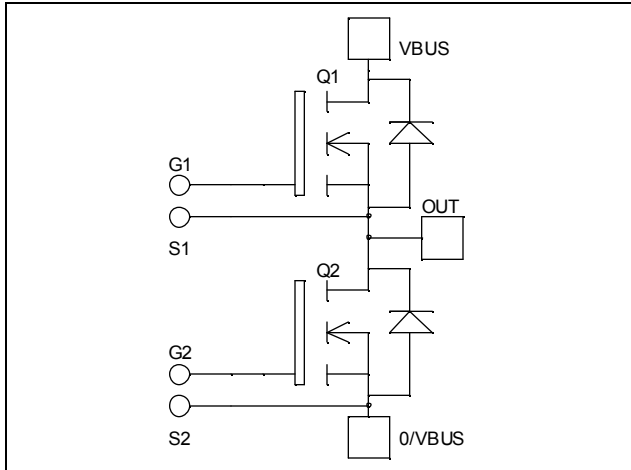


*Phase leg  
MOSFET Power Module*

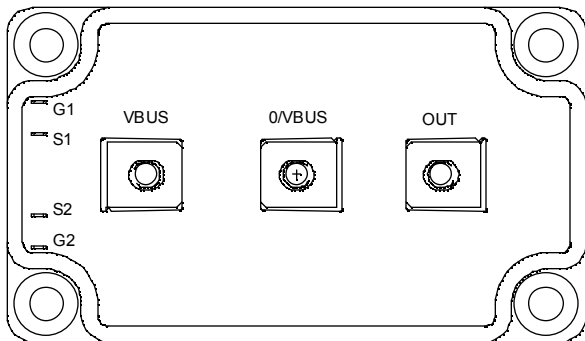
**$V_{DSS} = 500V$**   
 **$R_{DSon} = 19m\Omega$  typ @  $T_j = 25^\circ C$**   
 **$I_D = 163A$  @  $T_c = 25^\circ C$**


**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


**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	$T_c = 25^\circ C$	163
		$T_c = 80^\circ C$	122
$I_{DM}$	Pulsed Drain current	652	A
$V_{GS}$	Gate - Source Voltage	$\pm 30$	V
$R_{DSon}$	Drain - Source ON Resistance	22.5	m $\Omega$
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	1136
$I_{AR}$	Avalanche current (repetitive and non repetitive)	46	A
$E_{AR}$	Repetitive Avalanche Energy	50	mJ
$E_{AS}$	Single Pulse Avalanche Energy	2500	

**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	$V_{GS} = 0\text{V}, V_{DS} = 500\text{V}$			200	$\mu\text{A}$
		$V_{GS} = 0\text{V}, V_{DS} = 400\text{V}$			1000	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10\text{V}, I_D = 81.5\text{A}$		19	22.5	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 10\text{mA}$	3		5	V
$I_{GSS}$	Gate – Source Leakage Current	$V_{GS} = \pm 30\text{V}, V_{DS} = 0\text{V}$			$\pm 200$	nA

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS} = 0\text{V}$		22.4		nF
$C_{oss}$	Output Capacitance	$V_{DS} = 25\text{V}$		4.8		
$C_{rss}$	Reverse Transfer Capacitance	$f = 1\text{MHz}$		0.36		
$Q_g$	Total gate Charge	$V_{GS} = 10\text{V}$		492		nC
$Q_{gs}$	Gate – Source Charge	$V_{Bus} = 250\text{V}$		132		
$Q_{gd}$	Gate – Drain Charge	$I_D = 163\text{A}$		260		
$T_{d(on)}$	Turn-on Delay Time	<b>Inductive switching @ 125°C</b> $V_{GS} = 15\text{V}$ $V_{Bus} = 333\text{V}$ $I_D = 163\text{A}$ $R_G = 1\Omega$		18		ns
$T_r$	Rise Time			35		
$T_{d(off)}$	Turn-off Delay Time			87		
$T_f$	Fall Time			77		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ 25°C</b> $V_{GS} = 15\text{V}, V_{Bus} = 333\text{V}$ $I_D = 163\text{A}, R_G = 1\Omega$		3020		$\mu\text{J}$
$E_{off}$	Turn-off Switching Energy			2904		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ 125°C</b> $V_{GS} = 15\text{V}, V_{Bus} = 333\text{V}$ $I_D = 163\text{A}, R_G = 1\Omega$		4964		$\mu\text{J}$
$E_{off}$	Turn-off Switching Energy			3384		

**Source - Drain diode ratings and characteristics**

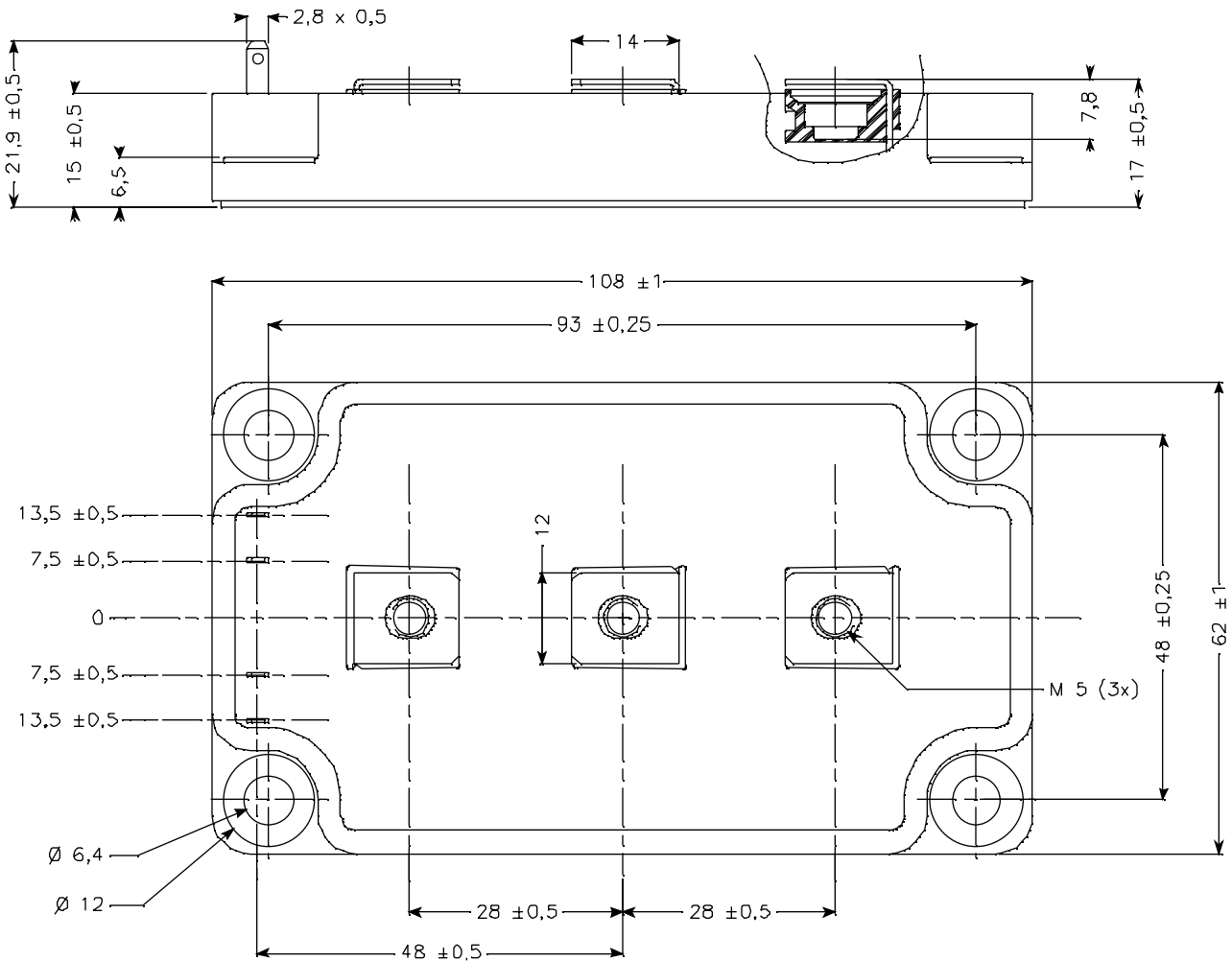
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$I_S$	Continuous Source current (Body diode)	$T_c = 25^\circ\text{C}$			163	A
		$T_c = 80^\circ\text{C}$			122	
$V_{SD}$	Diode Forward Voltage	$V_{GS} = 0\text{V}, I_S = -163\text{A}$			1.3	V
$dv/dt$	Peak Diode Recovery ①				15	V/ns
$t_{rr}$	Reverse Recovery Time	$I_S = -163\text{A}$ $V_R = 333\text{V}$ $di/dt = 400\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$		233	ns
			$T_j = 125^\circ\text{C}$		499	
$Q_{rr}$	Reverse Recovery Charge	$I_S = -163\text{A}$ $V_R = 333\text{V}$ $di/dt = 400\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$		7.6	$\mu\text{C}$
			$T_j = 125^\circ\text{C}$		22.8	

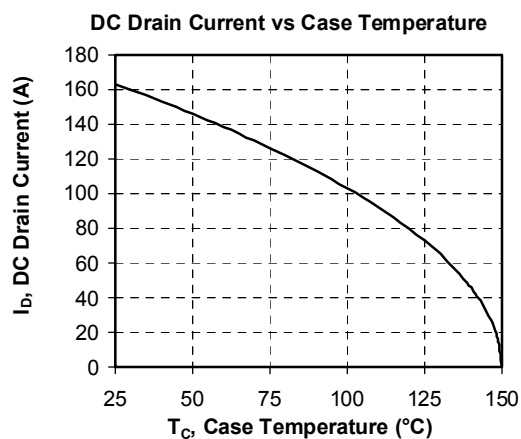
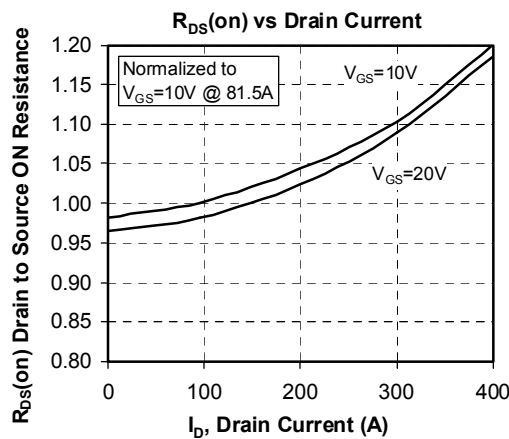
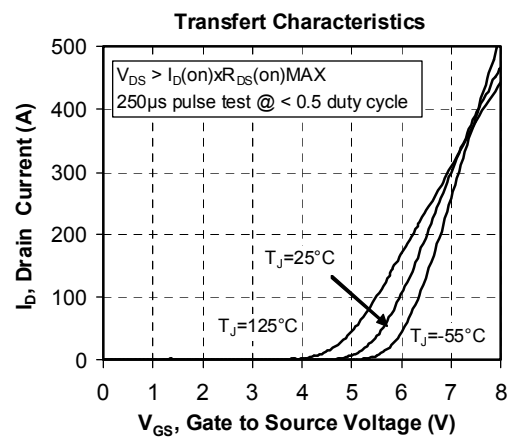
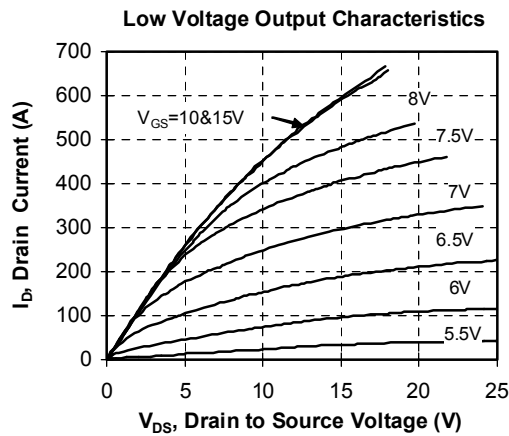
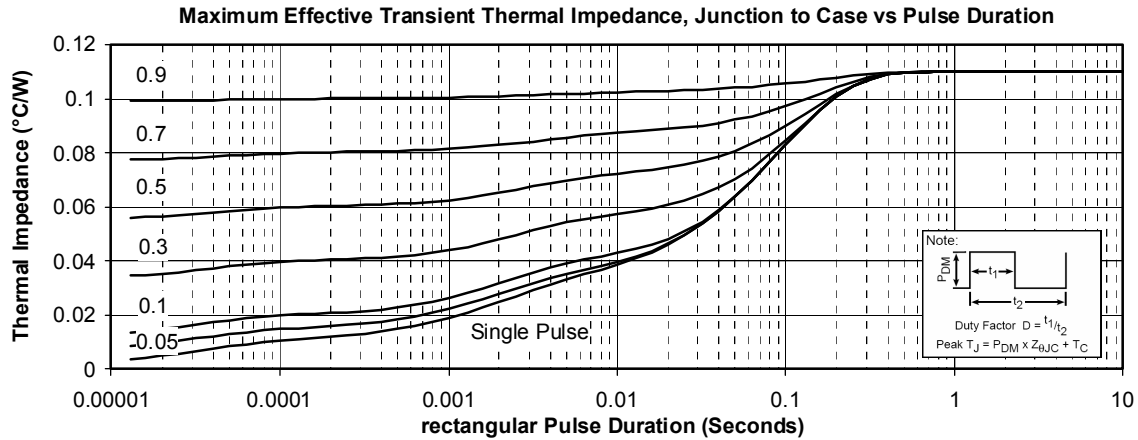
 ①  $dv/dt$  numbers reflect the limitations of the circuit rather than the device itself.

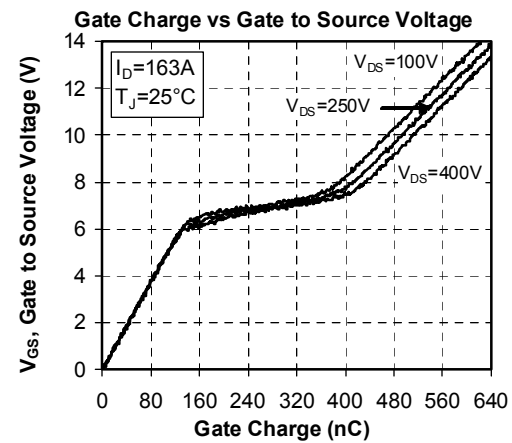
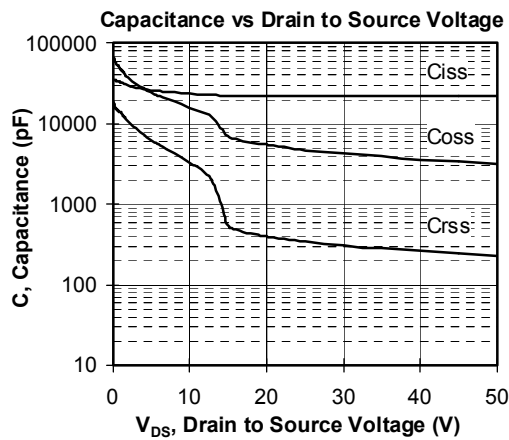
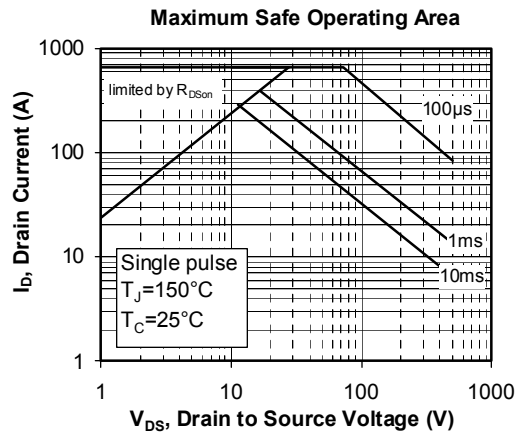
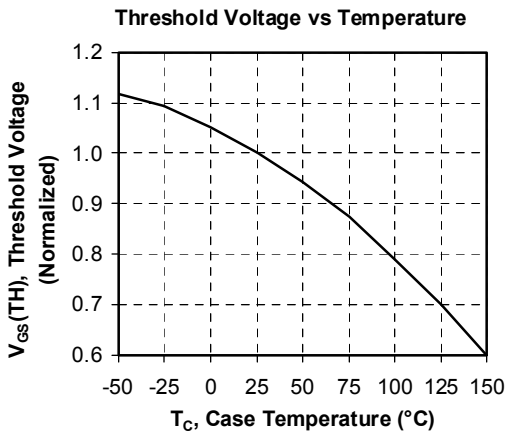
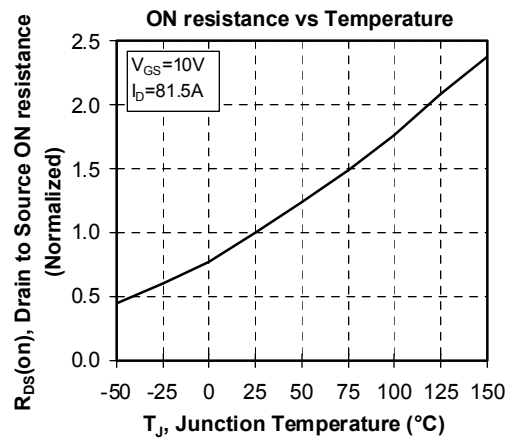
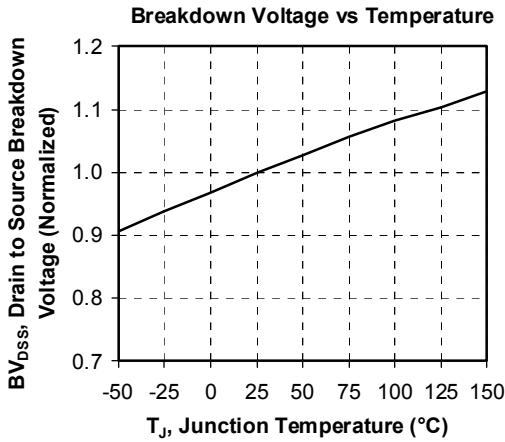
$$I_S \leq -163\text{A} \quad di/dt \leq 700\text{A}/\mu\text{s} \quad V_R \leq V_{DSS} \quad T_j \leq 150^\circ\text{C}$$

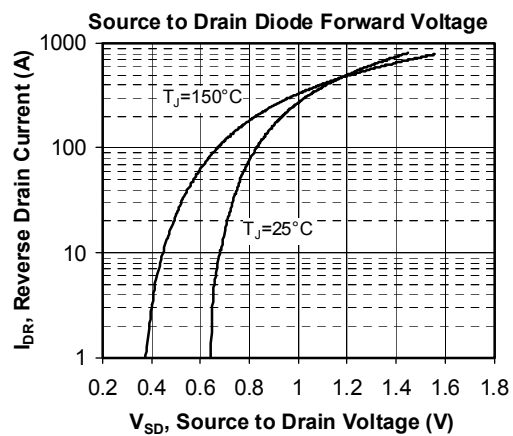
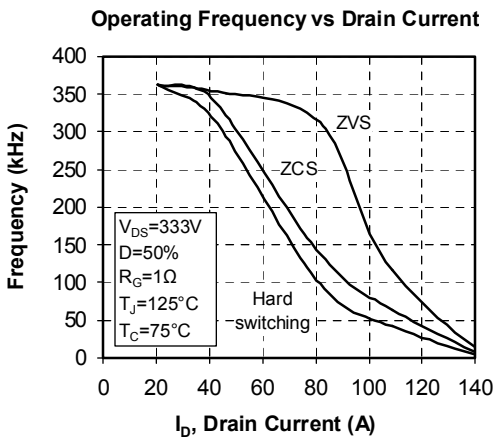
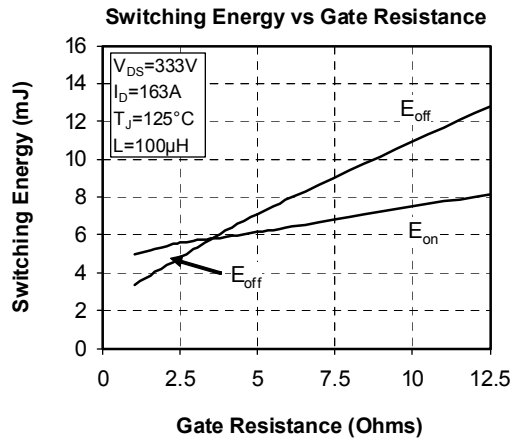
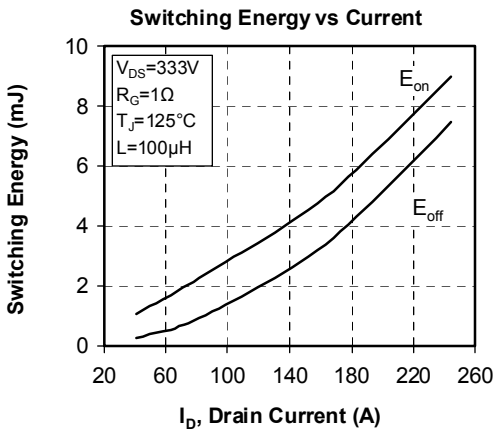
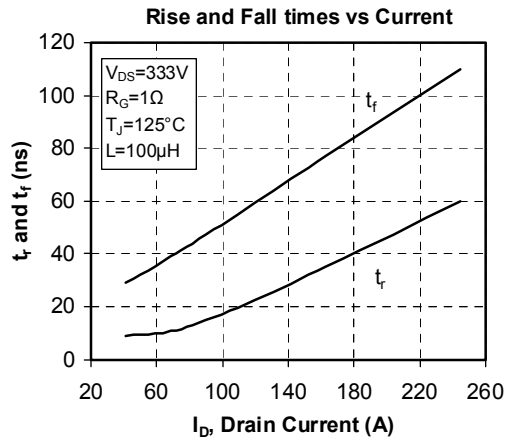
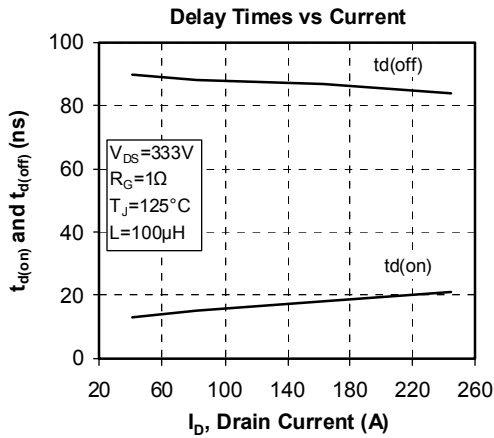
**Thermal and package characteristics**
**Symbol Characteristic**
**Min Typ Max Unit**

Symbol	Characteristic	Min	Typ	Max	Unit	
$R_{thJC}$	Junction to Case Thermal Resistance			0.11	°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](http://www.microsemi.com)

**Typical Performance Curve**






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