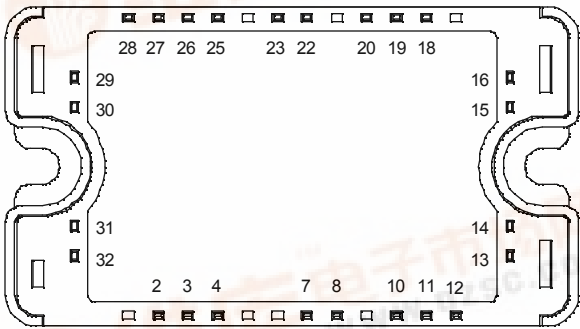
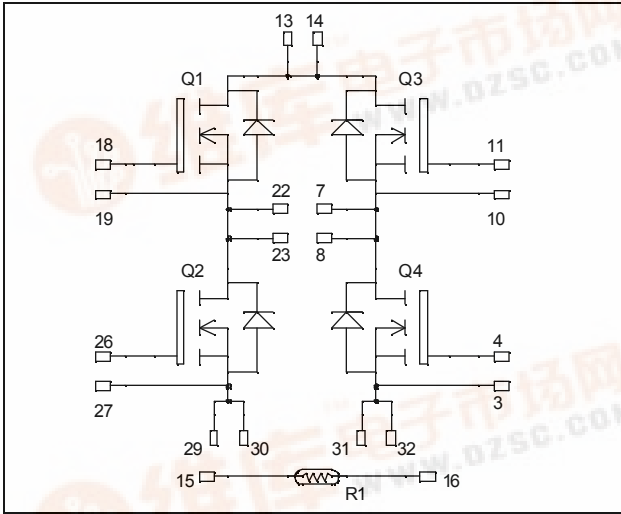




# APT50H10FT3G

## Full - Bridge MOSFET Power Module

**$V_{DSS} = 500V$**   
 **$R_{DSon} = 100m\Omega$  typ @  $T_j = 25^\circ C$**   
 **$I_D = 37A$  @  $T_c = 25^\circ C$**



All multiple inputs and outputs must be shorted together  
 Example: 13/14 ; 29/30 ; 22/23 ...

### Application

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

### 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
- Internal thermistor for temperature monitoring
- High level of integration

### Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Solderable terminals both for power and signal for easy PCB mounting
- Low profile
- Each leg can be easily paralleled to achieve a phase leg of twice the current capability
- RoHS Compliant

### Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
$V_{DSS}$	Drain - Source Breakdown Voltage	500	V
$I_D$	Continuous Drain Current	$T_c = 25^\circ C$	37
		$T_c = 80^\circ C$	28
$I_{DM}$	Pulsed Drain current	140	
$V_{GS}$	Gate - Source Voltage	$\pm 30$	V
$R_{DSon}$	Drain - Source ON Resistance	120	m $\Omega$
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	312
$I_{AR}$	Avalanche current (repetitive and non repetitive)	37	A
$E_{AR}$	Repetitive Avalanche Energy	50	mJ
$E_{AS}$	Single Pulse Avalanche Energy	1600	

**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	$V_{GS} = 0V, V_{DS} = 500V$			100	$\mu\text{A}$
		$V_{GS} = 0V, V_{DS} = 400V$			500	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 18.5A$		100	120	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 1\text{mA}$	3		5	V
$I_{GSS}$	Gate – Source Leakage Current	$V_{GS} = \pm 30V, V_{DS} = 0V$			$\pm 100$	nA

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1\text{MHz}$		4367		pF
$C_{oss}$	Output Capacitance			894		
$C_{rss}$	Reverse Transfer Capacitance			61		
$Q_g$	Total gate Charge	$V_{GS} = 10V$ $V_{Bus} = 250V$ $I_D = 37A$		96		nC
$Q_{gs}$	Gate – Source Charge			24		
$Q_{gd}$	Gate – Drain Charge			49		
$T_{d(on)}$	Turn-on Delay Time	<b>Inductive switching @ <math>125^\circ\text{C}</math></b> $V_{GS} = 15V$ $V_{Bus} = 333V$ $I_D = 37A$ $R_G = 5\Omega$		15		ns
$T_r$	Rise Time			21		
$T_{d(off)}$	Turn-off Delay Time			73		
$T_f$	Fall Time			52		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ <math>25^\circ\text{C}</math></b> $V_{GS} = 15V, V_{Bus} = 333V$ $I_D = 37A, R_G = 5\Omega$		566		$\mu\text{J}$
$E_{off}$	Turn-off Switching Energy			545		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ <math>125^\circ\text{C}</math></b> $V_{GS} = 15V, V_{Bus} = 333V$ $I_D = 37A, R_G = 5\Omega$		931		$\mu\text{J}$
$E_{off}$	Turn-off Switching Energy			635		

**Source - Drain diode ratings and characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$I_S$	Continuous Source current (Body diode)	$T_c = 25^\circ\text{C}$		37		A
		$T_c = 80^\circ\text{C}$		28		
$V_{SD}$	Diode Forward Voltage	$V_{GS} = 0V, I_S = -37A$			1.3	V
$dv/dt$	Peak Diode Recovery ①				15	V/ns
$t_{rr}$	Reverse Recovery Time	$I_S = -37A$ $V_R = 333V$ $di/dt = 100A/\mu\text{s}$	$T_j = 25^\circ\text{C}$		280	ns
			$T_j = 125^\circ\text{C}$		600	
$Q_{rr}$	Reverse Recovery Charge	$I_S = -37A$ $V_R = 333V$ $di/dt = 100A/\mu\text{s}$	$T_j = 25^\circ\text{C}$		2.3	$\mu\text{C}$
			$T_j = 125^\circ\text{C}$		6.4	

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

 $I_S \leq -37A$     $di/dt \leq 100A/\mu\text{s}$     $V_R \leq V_{DSS}$     $T_j \leq 150^\circ\text{C}$

**Thermal and package characteristics**

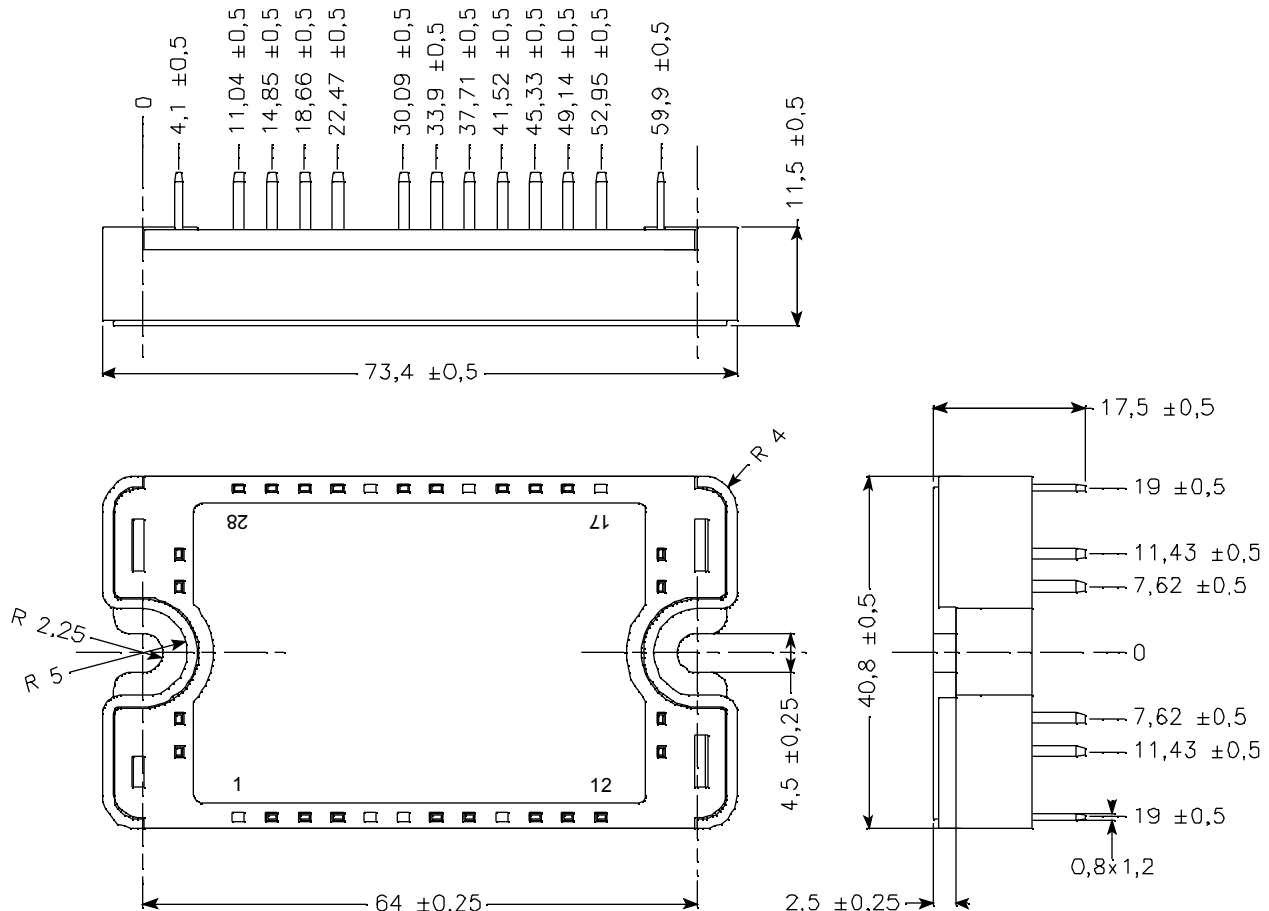
Symbol	Characteristic	Min	Typ	Max	Unit	
R <sub>thJC</sub>	Junction to Case Thermal Resistance			0.40	°C/W	
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t = 1 min, I <sub>isol</sub> < 1mA, 50/60Hz	2500			V	
T <sub>J</sub>	Operating junction temperature range	-40		150	°C	
T <sub>STG</sub>	Storage Temperature Range	-40		125		
T <sub>C</sub>	Operating Case Temperature	-40		100		
Torque	Mounting torque	To heatsink	M4	2.5	4.7	N.m
Wt	Package Weight				110	g

**Temperature sensor NTC** (see application note APT0406 on [www.microsemi.com](http://www.microsemi.com) for more information).

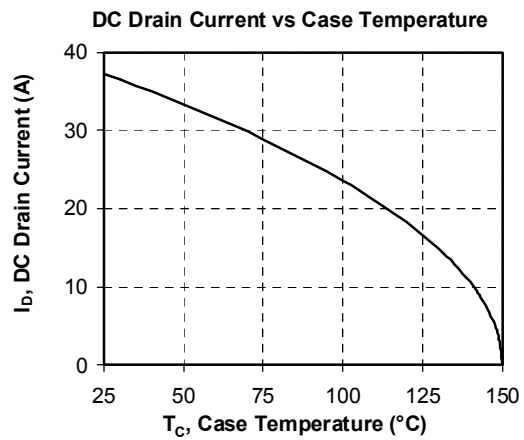
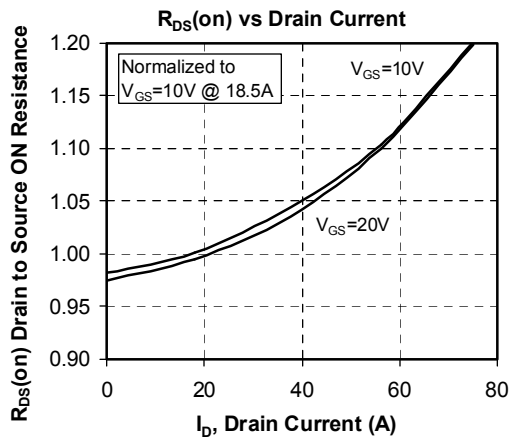
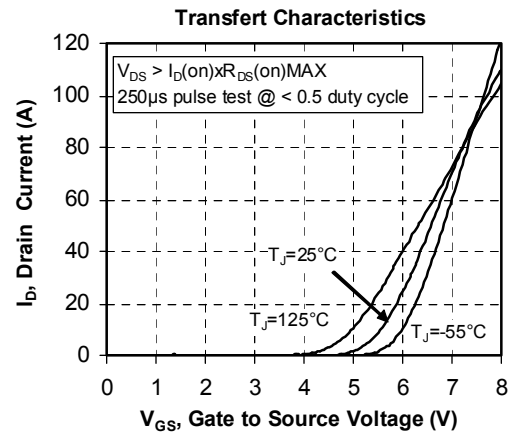
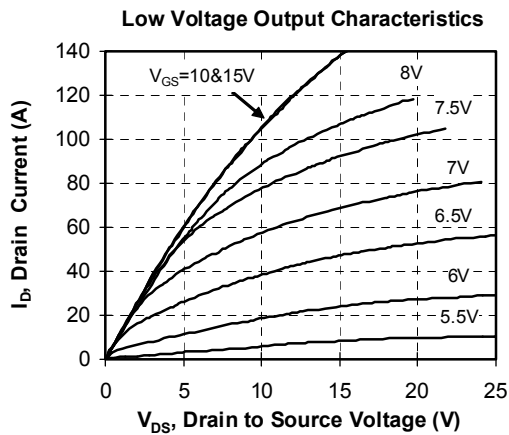
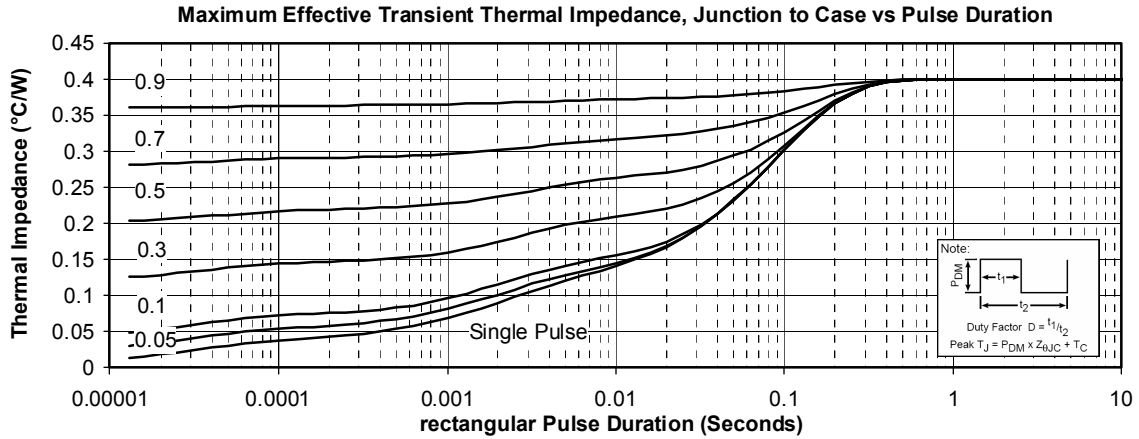
Symbol	Characteristic	Min	Typ	Max	Unit
R <sub>25</sub>	Resistance @ 25°C		50		kΩ
B <sub>25/85</sub>	T <sub>25</sub> = 298.15 K		3952		K

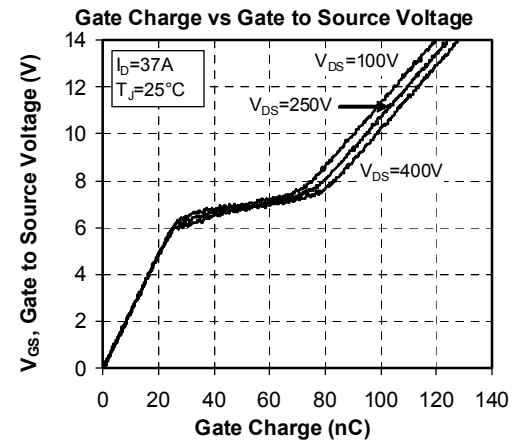
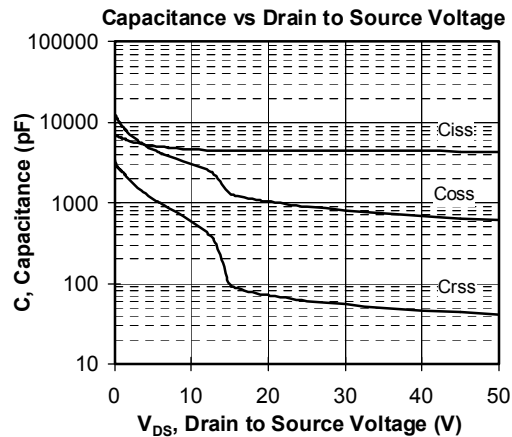
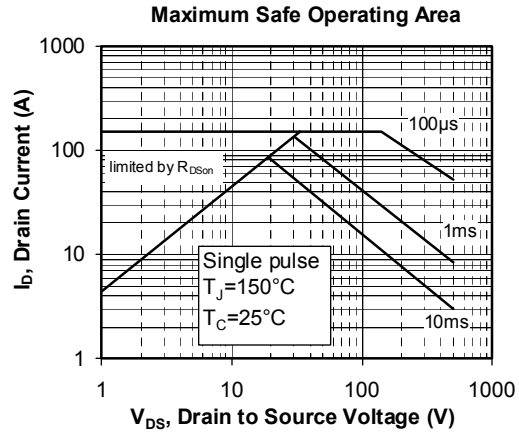
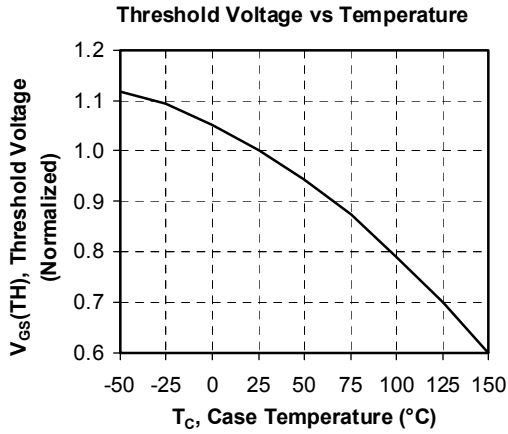
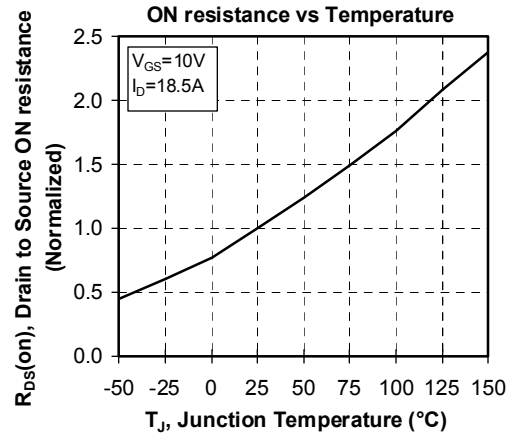
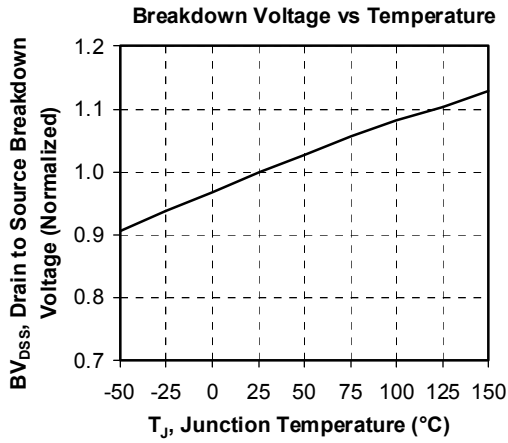
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

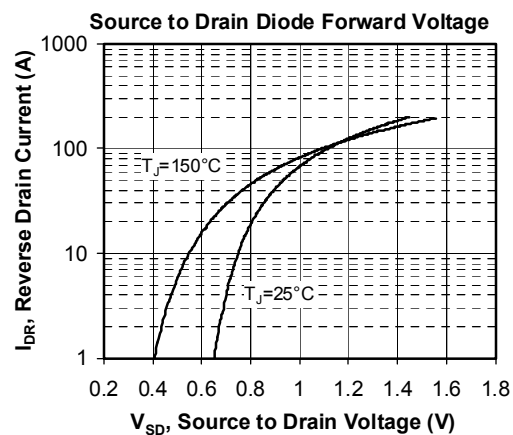
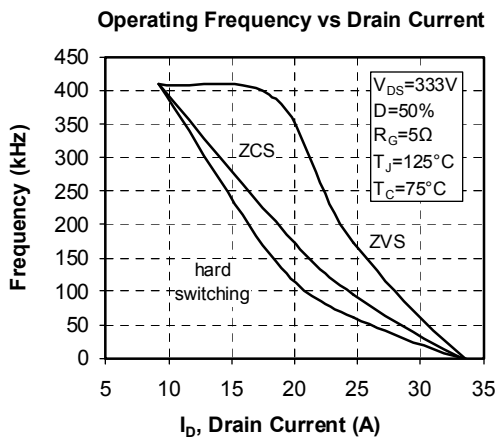
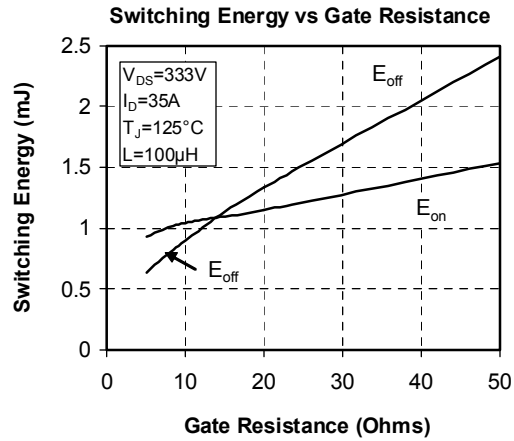
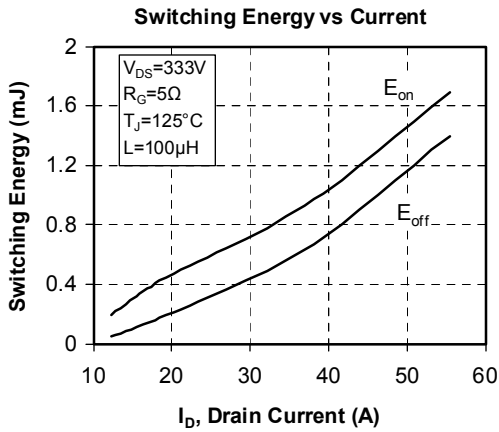
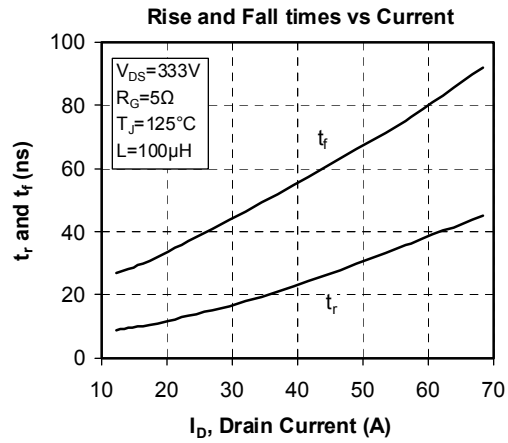
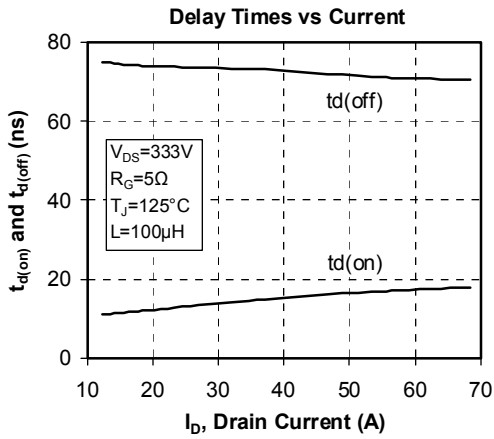
T: Thermistor temperature  
 R<sub>T</sub>: Thermistor value at T

**SP3 Package outline** (dimensions in mm)

 See application note 1901 - Mounting Instructions for SP3 Power Modules on [www.microsemi.com](http://www.microsemi.com)

## Typical Performance Curve







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