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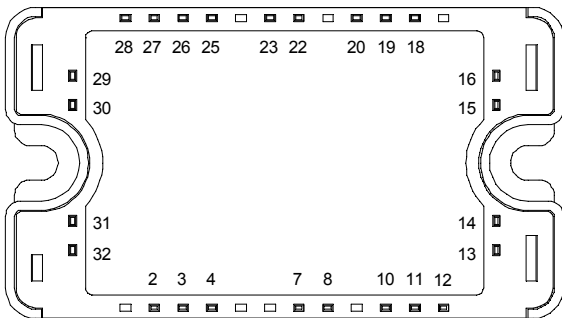
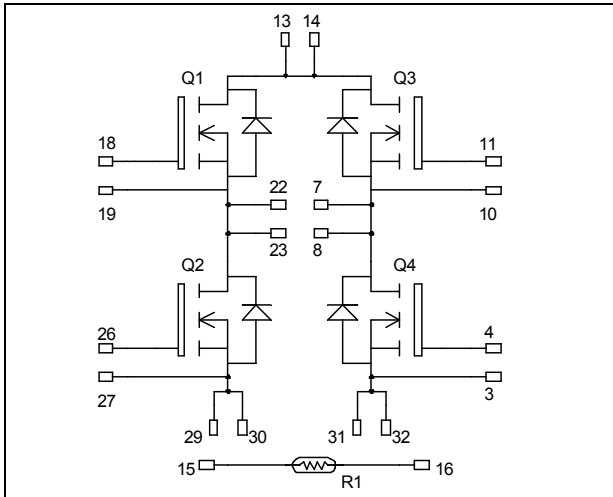
Email & Skype: [info@chipsmall.com](mailto:info@chipsmall.com) Web: [www.chipsmall.com](http://www.chipsmall.com)

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



## Full - Bridge MOSFET Power Module

$V_{DSS} = 500V$   
 $R_{DSon} = 75m\Omega \text{ typ @ } T_j = 25^\circ C$   
 $I_D = 46A \text{ @ } T_c = 25^\circ C$



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	$T_c = 25^\circ C$	46
		$T_c = 80^\circ C$	34
$I_{DM}$	Pulsed Drain current	184	
$V_{GS}$	Gate - Source Voltage	$\pm 30$	V
$R_{DSon}$	Drain - Source ON Resistance	90	$m\Omega$
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	357
$I_{AR}$	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	$V_{GS} = 0V, V_{DS} = 500V$			100	$\mu\text{A}$
		$T_j = 25^\circ\text{C}$				
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 0V, V_{DS} = 400V$			500	$\text{m}\Omega$
		$T_j = 125^\circ\text{C}$				
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 23A$		75	90	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 2.5\text{mA}$	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	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1\text{MHz}$		5600		pF
$C_{oss}$	Output Capacitance			1200		
$C_{rss}$	Reverse Transfer Capacitance			90		
$Q_g$	Total gate Charge	$V_{GS} = 10V$ $V_{Bus} = 250V$ $I_D = 46A$		123		nC
$Q_{gs}$	Gate – Source Charge			33		
$Q_{gd}$	Gate – Drain Charge			65		
$T_{d(on)}$	Turn-on Delay Time	<b>Inductive switching @ 125°C</b> $V_{GS} = 15V$ $V_{Bus} = 333V$ $I_D = 46A$ $R_G = 5\Omega$		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> $V_{GS} = 15V, V_{Bus} = 333V$ $I_D = 46A, R_G = 5\Omega$		755		$\mu\text{J}$
$E_{off}$	Turn-off Switching Energy			726		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ 125°C</b> $V_{GS} = 15V, V_{Bus} = 333V$ $I_D = 46A, R_G = 5\Omega$		1241		$\mu\text{J}$
$E_{off}$	Turn-off Switching Energy			846		

**Source - Drain diode ratings and characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$I_S$	Continuous Source current (Body diode)	$T_c = 25^\circ\text{C}$			46	A
		$T_c = 80^\circ\text{C}$			34	
$V_{SD}$	Diode Forward Voltage	$V_{GS} = 0V, I_S = -46A$			1.3	V
dv/dt	Peak Diode Recovery ①				15	V/ns
$t_{rr}$	Reverse Recovery Time	$I_S = -46A$ $V_R = 333V$ $di/dt = 100A/\mu\text{s}$	$T_j = 25^\circ\text{C}$		233	ns
			$T_j = 125^\circ\text{C}$		499	
$Q_{rr}$	Reverse Recovery Charge	$I_S = -46A$ $V_R = 333V$ $di/dt = 100A/\mu\text{s}$	$T_j = 25^\circ\text{C}$		1.9	$\mu\text{C}$
			$T_j = 125^\circ\text{C}$		5.7	

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

 $I_S \leq -46A$     $di/dt \leq 700A/\mu\text{s}$     $V_R \leq V_{DSS}$     $T_j \leq 150^\circ\text{C}$



## Thermal and package characteristics

Symbol	Characteristic	Min	Typ	Max	Unit	
R <sub>thJC</sub>	Junction to Case Thermal Resistance			0.35	°C/W	
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz	4000			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	3	N.m
Wt	Package Weight			110		g

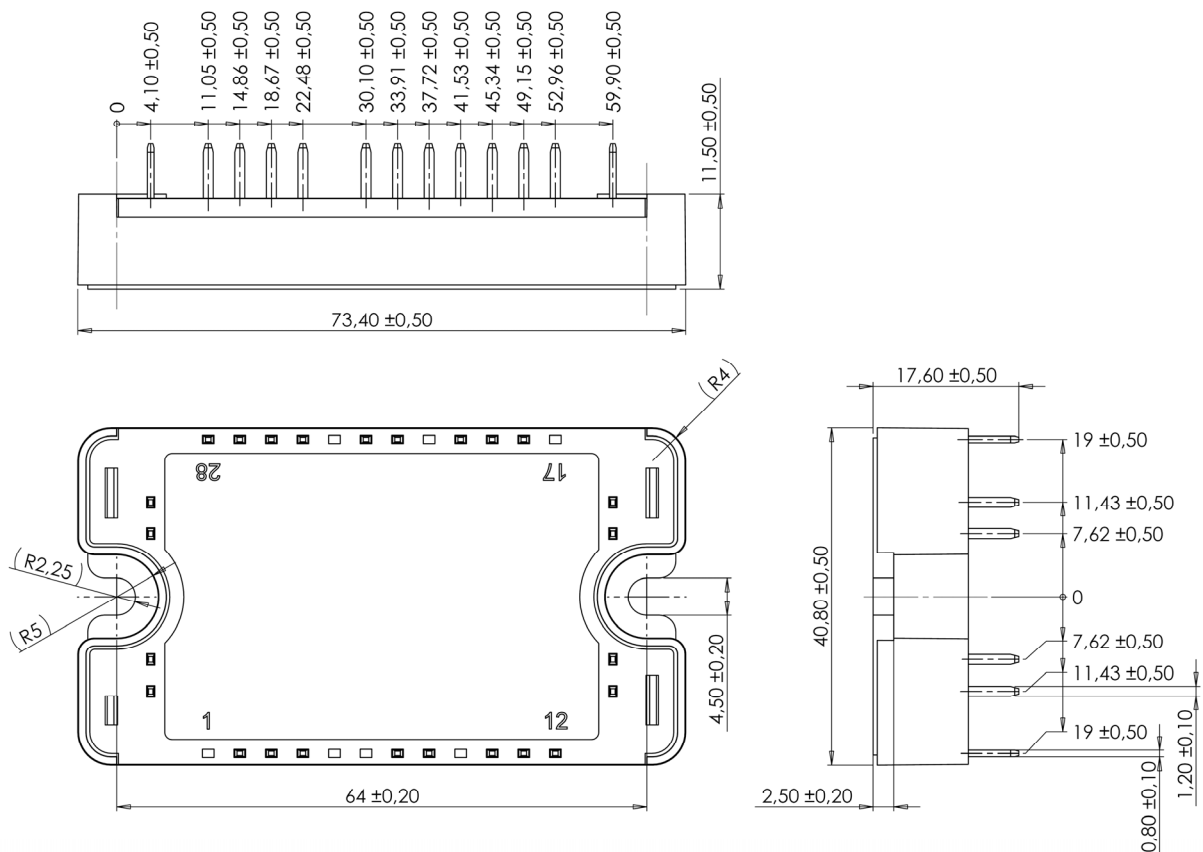
## Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

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

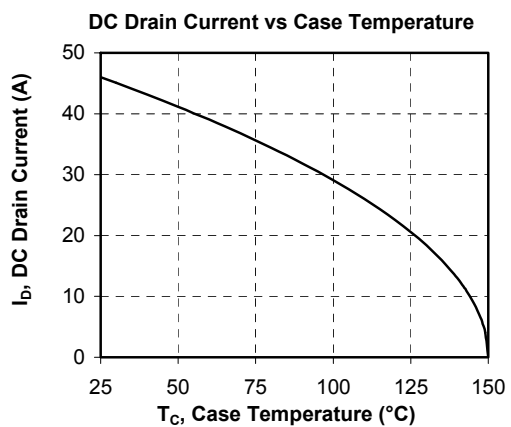
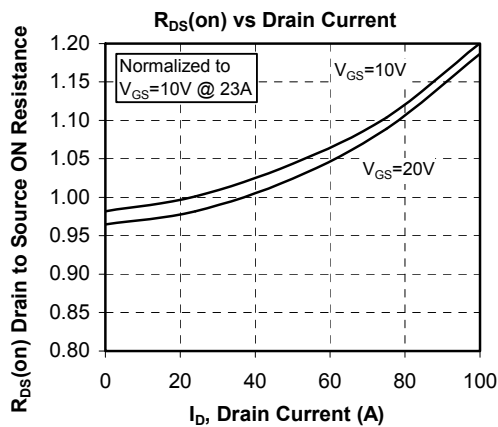
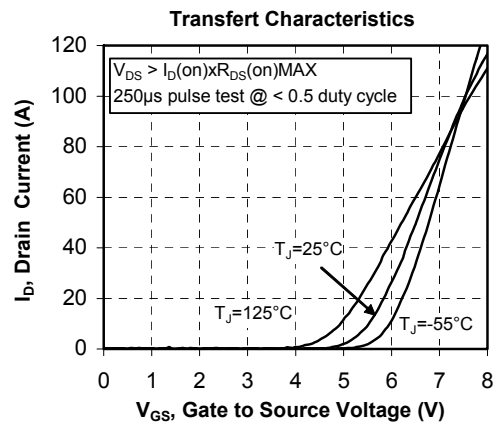
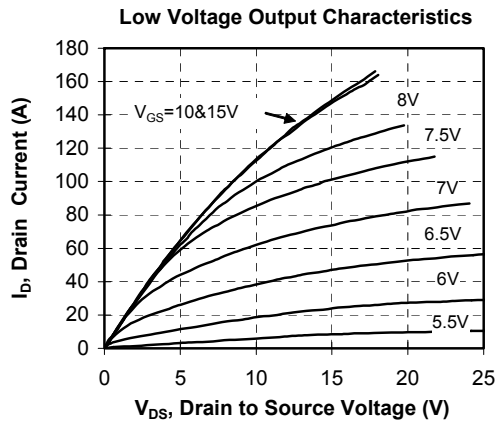
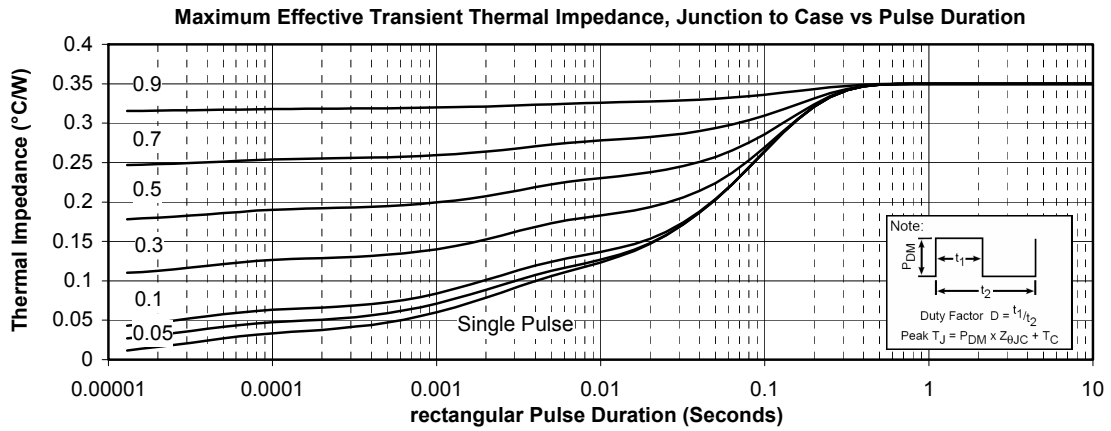
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

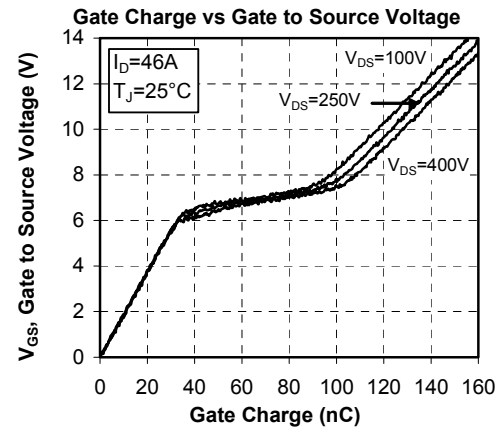
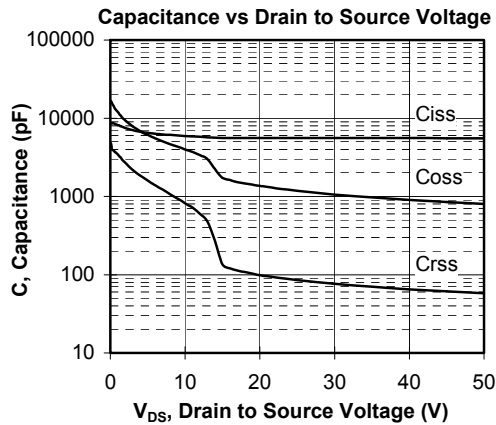
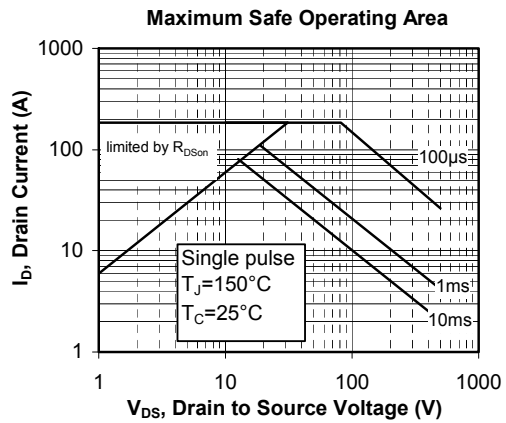
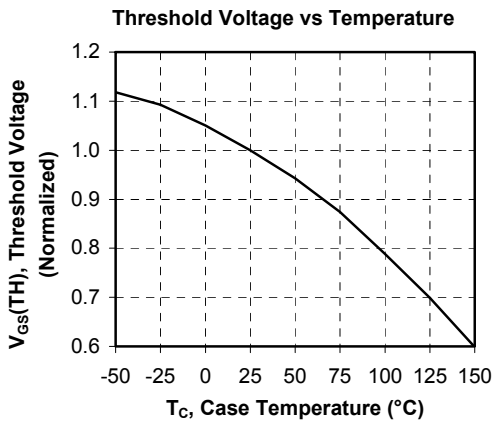
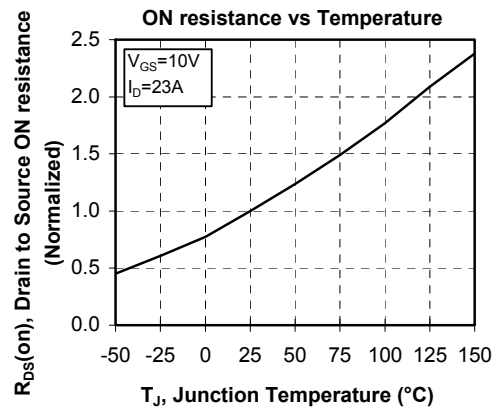
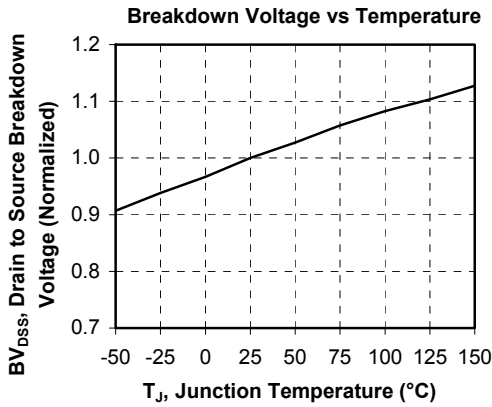
T: Thermistor temperature  
 R<sub>T</sub>: Thermistor value at T

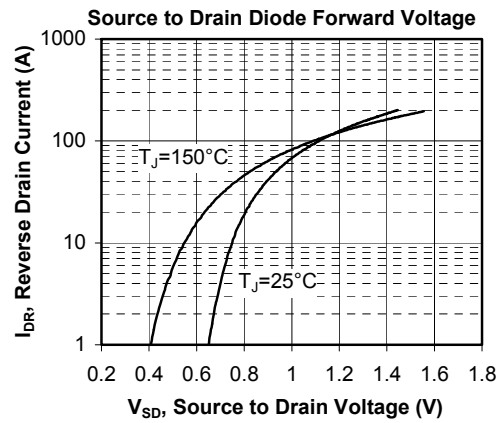
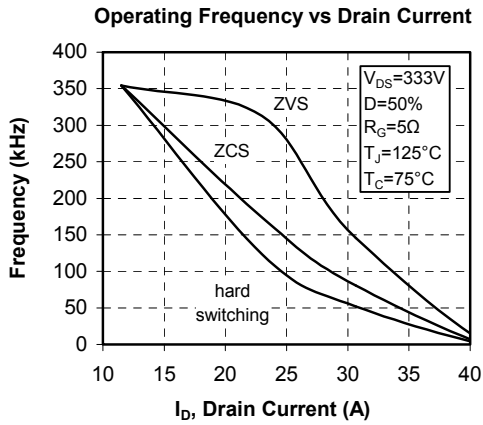
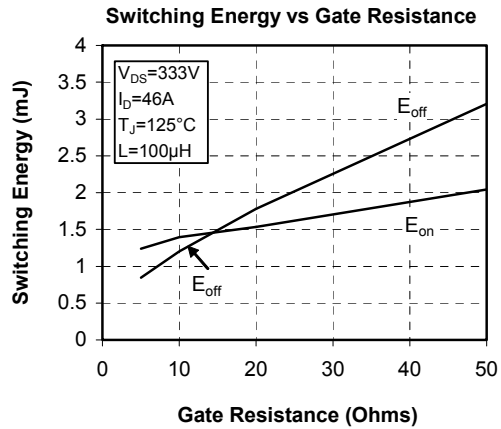
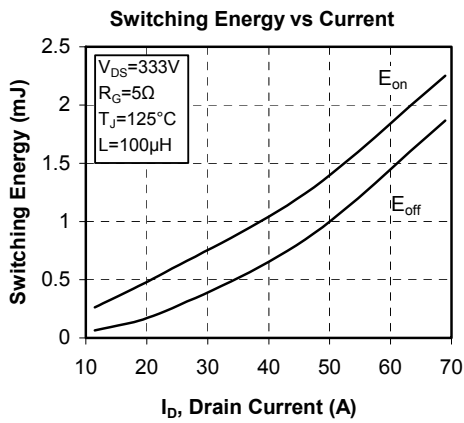
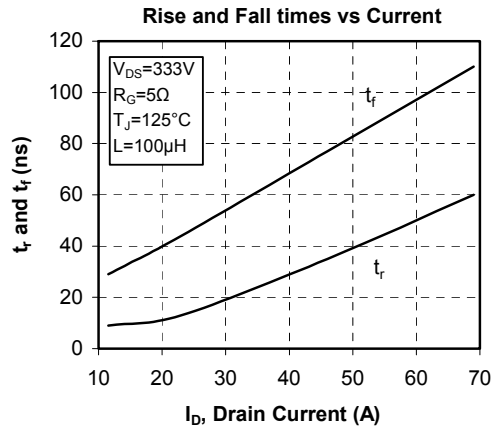
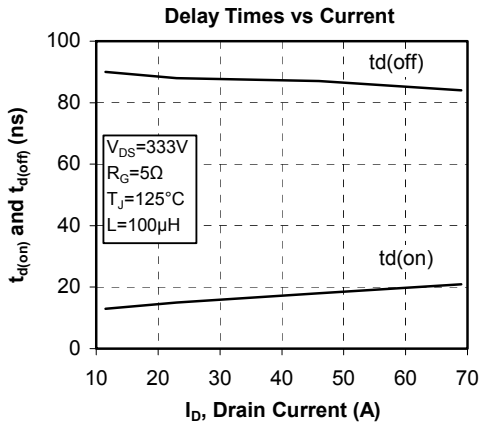
## SP3 Package outline (dimensions in mm)



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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