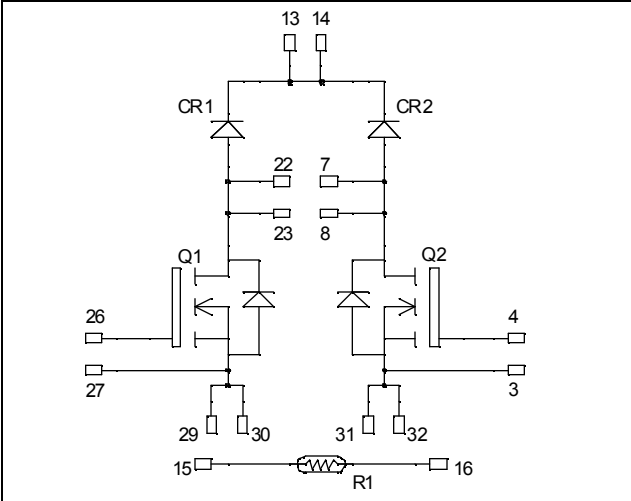


## Dual Boost chopper MOSFET Power Module

$V_{DSS} = 500V$   
 $R_{DSon} = 65m\Omega \text{ typ @ } T_j = 25^\circ C$   
 $I_D = 51A \text{ @ } T_c = 25^\circ C$

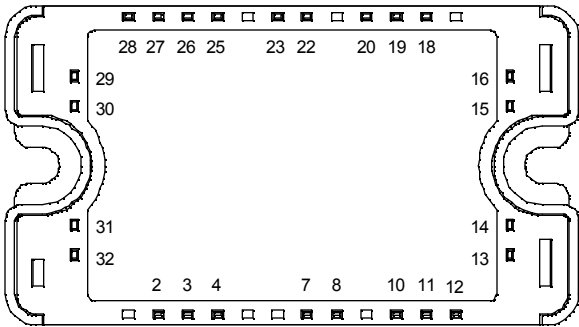


### Application

- AC and DC motor control
- Switched Mode Power Supplies
- Power Factor Correction

### Features

- Power MOS 7<sup>®</sup> MOSFETs
  - Low  $R_{DSon}$
  - Low input and Miller capacitance
  - Low gate charge
  - 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 single boost of twice the current capability
- RoHS Compliant

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

### Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
$V_{DSS}$	Drain - Source Breakdown Voltage	500	V
$I_D$	Continuous Drain Current	$T_c = 25^\circ C$	51
		$T_c = 80^\circ C$	38
$I_{DM}$	Pulsed Drain current	204	
$V_{GS}$	Gate - Source Voltage	$\pm 30$	V
$R_{DSon}$	Drain - Source ON Resistance	78	$m\Omega$
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	390
$I_{AR}$	Avalanche current (repetitive and non repetitive)	51	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**

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 500V$			100	$\mu\text{A}$
		$V_{GS} = 0V, V_{DS} = 400V$	$T_j = 25^\circ\text{C}$		500	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 25.5A$		65	78	$\text{m}\Omega$
$V_{GS(th)}$	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**

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
$C_{iss}$	Input Capacitance	$V_{GS} = 0V$		7000		pF
$C_{oss}$	Output Capacitance	$V_{DS} = 25V$		1400		
$C_{rss}$	Reverse Transfer Capacitance	$f = 1\text{MHz}$		90		
$Q_g$	Total gate Charge	$V_{GS} = 10V$		140		nC
$Q_{gs}$	Gate – Source Charge	$V_{Bus} = 250V$		40		
$Q_{gd}$	Gate – Drain Charge	$I_D = 51A$		70		
$T_{d(on)}$	Turn-on Delay Time	<b>Inductive switching @ <math>125^\circ\text{C}</math></b>		21		ns
$T_r$	Rise Time	$V_{GS} = 15V$		38		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 333V$		75		
$T_f$	Fall Time	$I_D = 51A$ $R_G = 3\Omega$		93		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ <math>25^\circ\text{C}</math></b>		1035		$\mu\text{J}$
$E_{off}$	Turn-off Switching Energy	$V_{GS} = 15V, V_{Bus} = 333V$ $I_D = 51A, R_G = 3\Omega$		845		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ <math>125^\circ\text{C}</math></b>		1556		$\mu\text{J}$
$E_{off}$	Turn-off Switching Energy	$V_{GS} = 15V, V_{Bus} = 333V$ $I_D = 51A, R_G = 3\Omega$		1013		

**Diode ratings and characteristics**

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage		600			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 600V$	$T_j = 25^\circ\text{C}$		350	$\mu\text{A}$
			$T_j = 125^\circ\text{C}$		600	
$I_F$	DC Forward Current			80		A
$V_F$	Diode Forward Voltage	$I_F = 80A$	$T_j = 25^\circ\text{C}$	1.45		V
			$T_j = 125^\circ\text{C}$	1.35		
$t_{rr}$	Reverse Recovery Time	$I_F = 80A$ $V_R = 300V$ $di/dt = 4500A/\mu\text{s}$	$T_j = 25^\circ\text{C}$	95		ns
			$T_j = 125^\circ\text{C}$	115		
$Q_{rr}$	Reverse Recovery Charge	$I_F = 80A$ $V_R = 300V$ $di/dt = 4500A/\mu\text{s}$	$T_j = 25^\circ\text{C}$	5.2		$\mu\text{C}$
			$T_j = 125^\circ\text{C}$	8		

## Thermal and package characteristics

*Symbol Characteristic*

			<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
R <sub>thJC</sub>	Junction to Case Thermal Resistance	Transistor			0.32	°C/W
		Diode			0.8	
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).

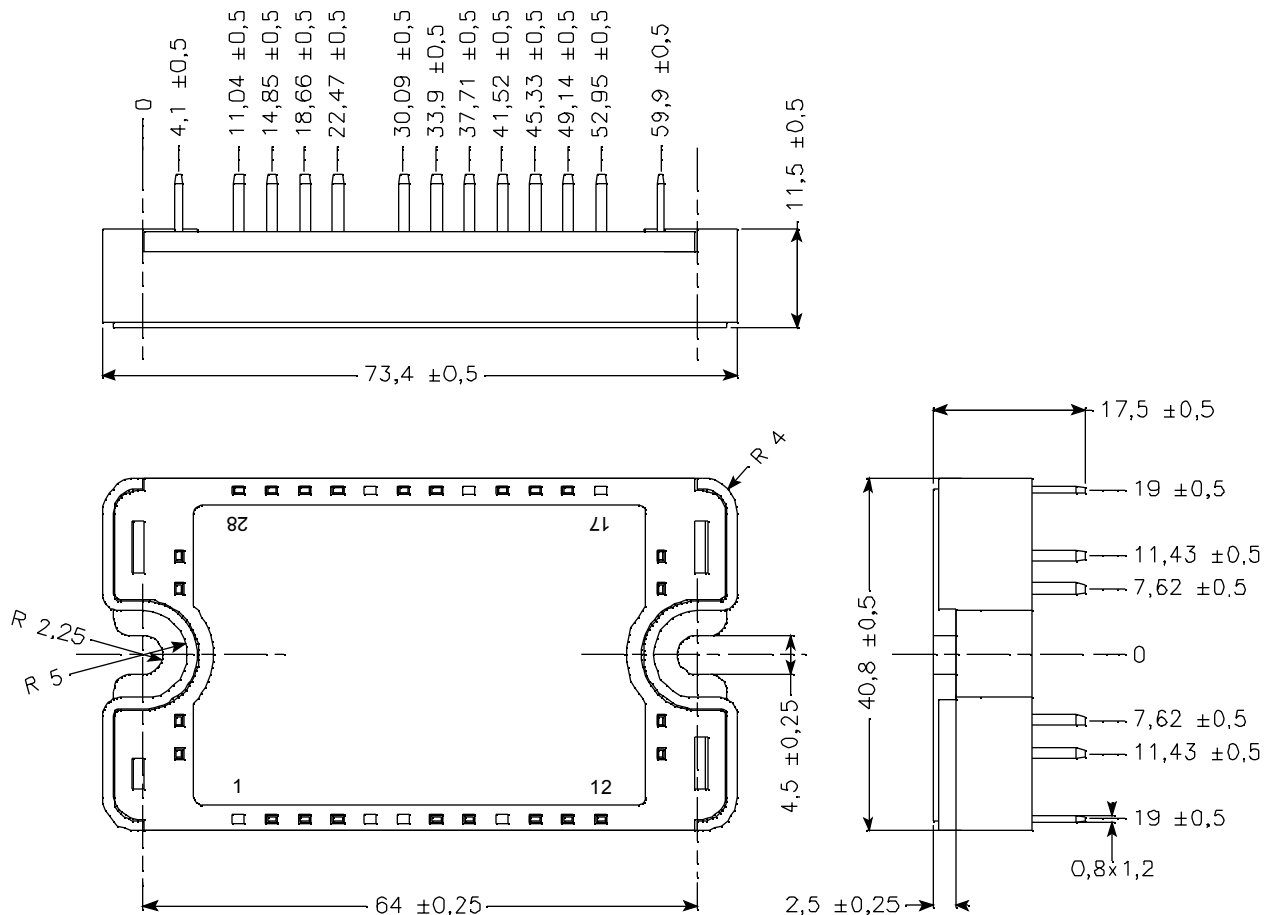
*Symbol Characteristic*

		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
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

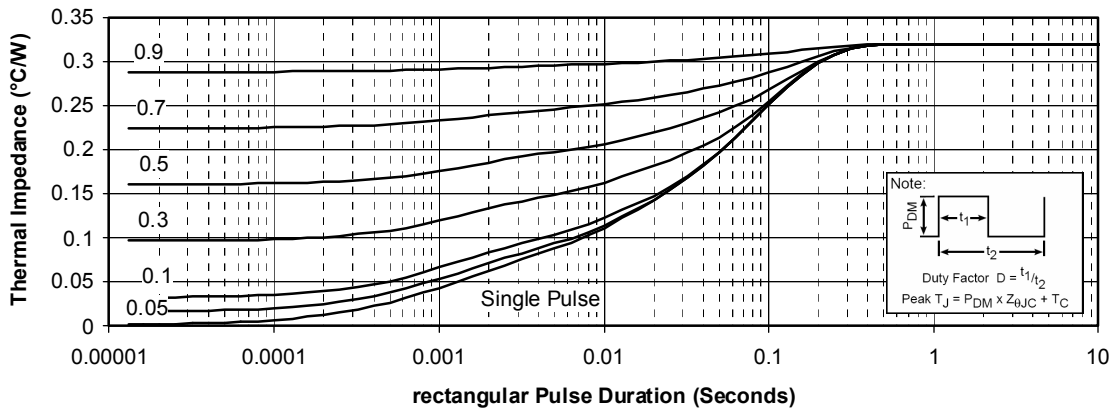
## SP3 Package outline (dimensions in mm)



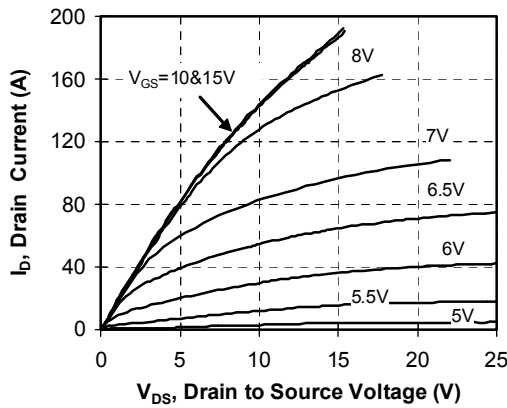
See application note 1901 - Mounting Instructions for SP3 Power Modules on [www.microsemi.com](http://www.microsemi.com)

## Typical Performance Curve

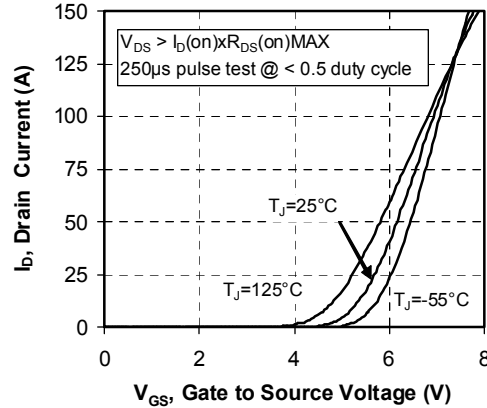
Maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration



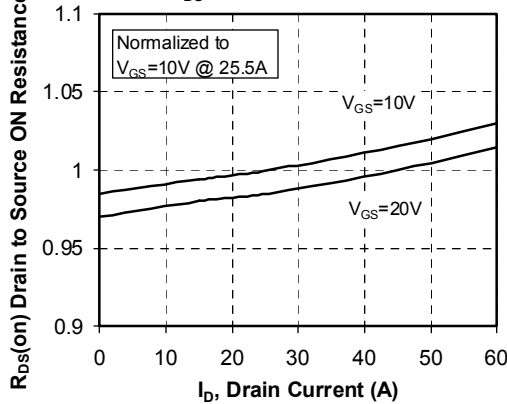
Low Voltage Output Characteristics



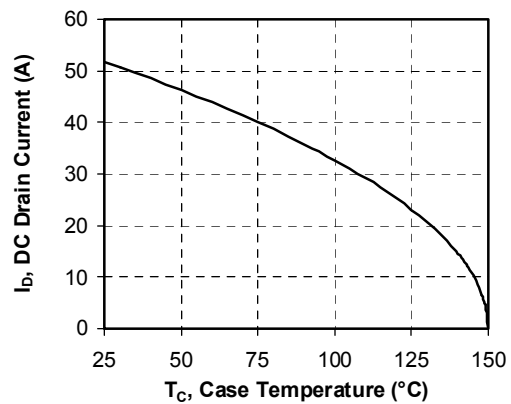
Transfer Characteristics

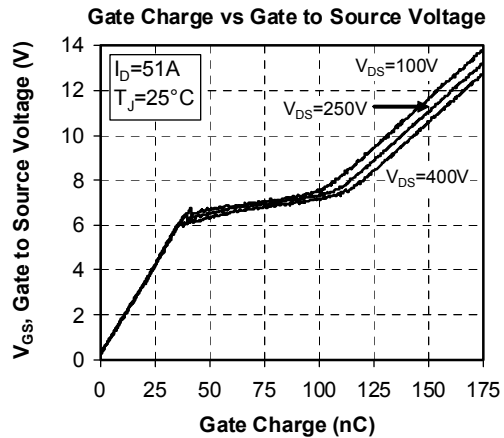
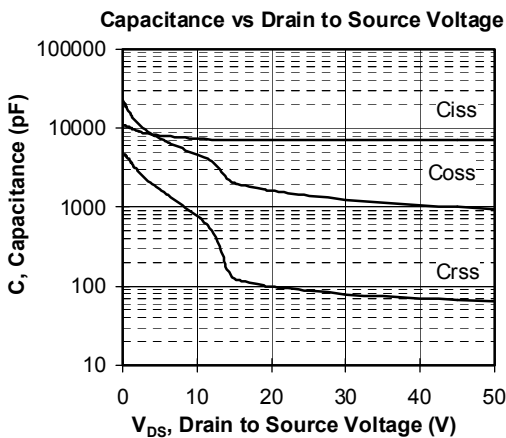
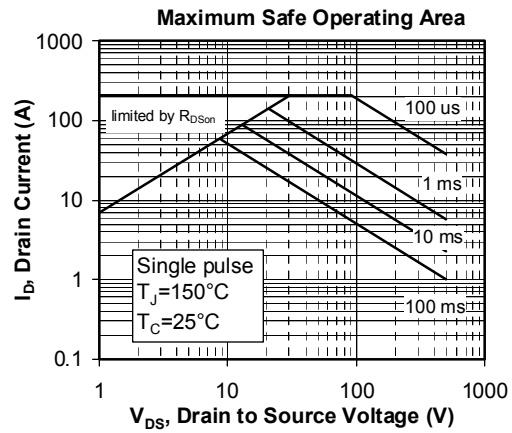
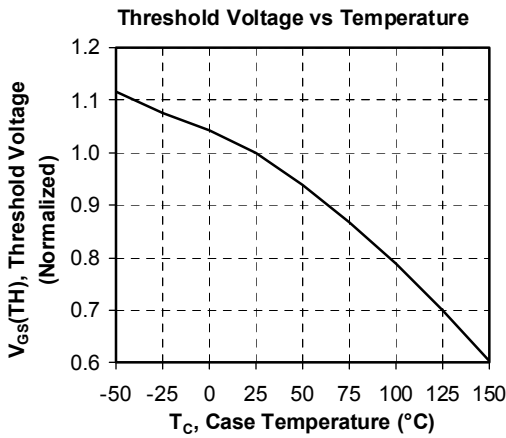
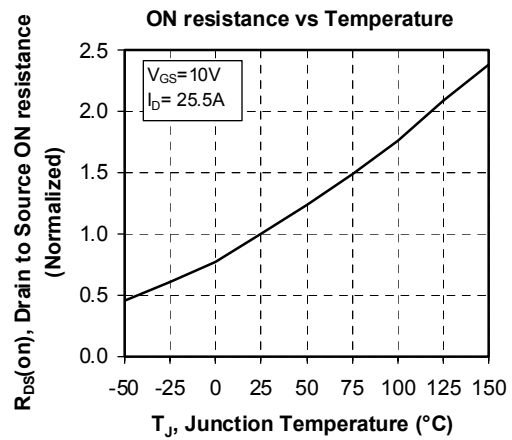
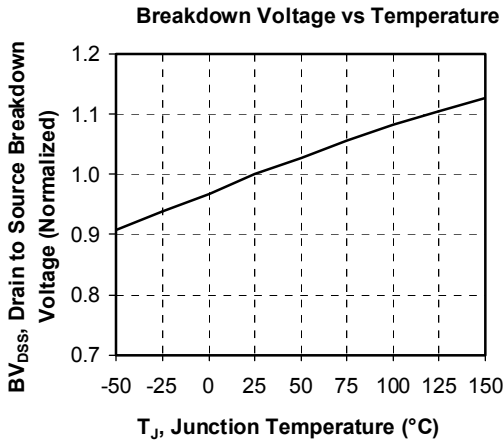


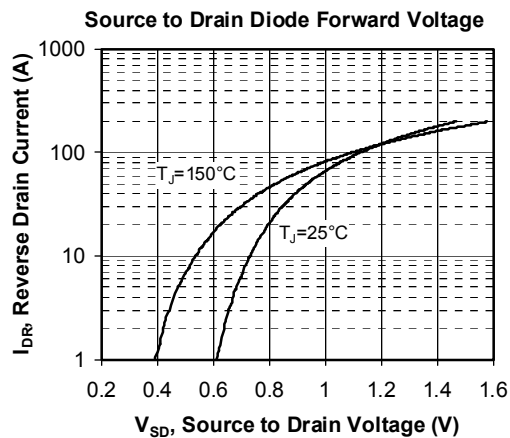
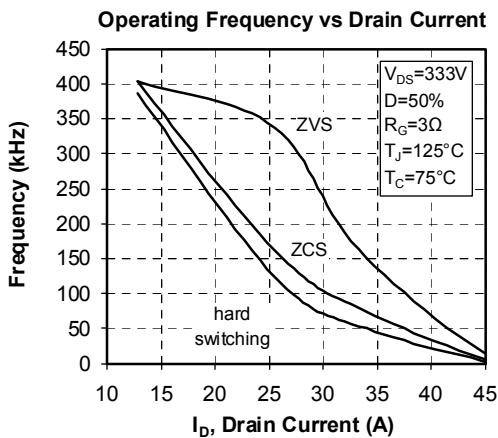
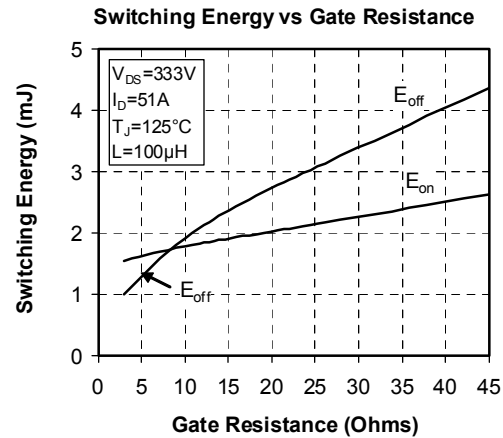
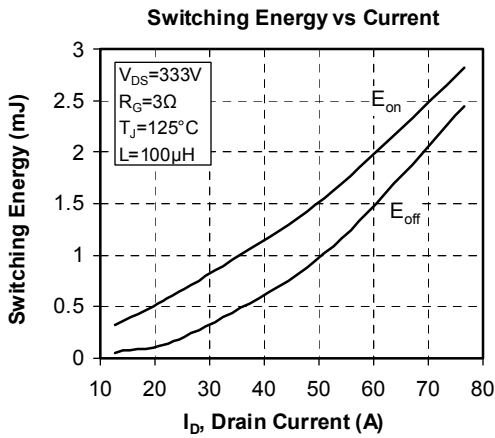
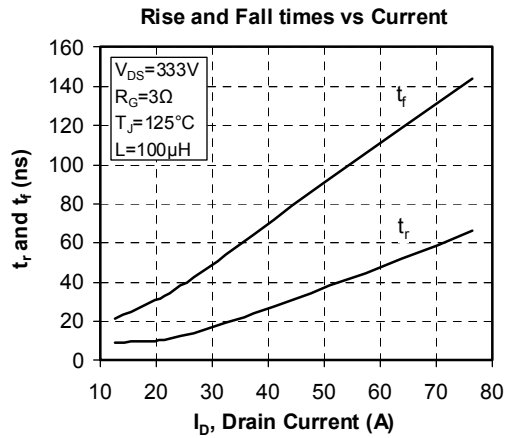
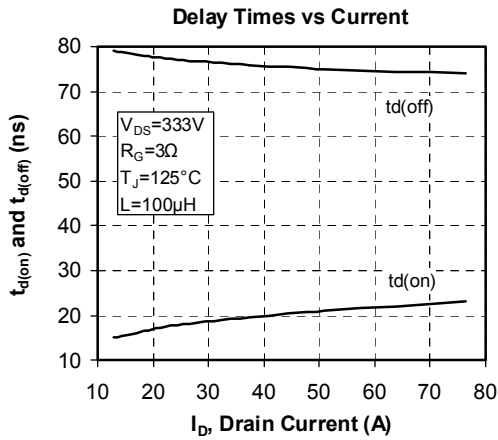
$R_{DS(on)}$  vs Drain Current



DC Drain Current vs Case Temperature







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