



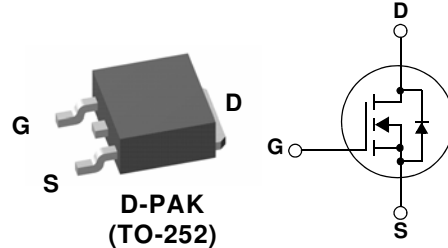
ON Semiconductor®

## FDD8445-F085

### N-Channel PowerTrench® MOSFET

40V, 50A, 6.7mΩ  
Features

- Typ  $R_{DS(on)} = 6.7m\Omega$  at  $V_{GS} = 10V$ ,  $I_D = 50A$
- Typ  $Q_{g(10)} = 45nC$  at  $V_{GS} = 10V$ ,  $I_D = 50A$
- Low Miller Charge
- Low  $Q_{rr}$  Body Diode
- UIS Capability (Single Pulse/ Repetitive Pulse)
- RoHS Compliant
- Qualified to AEC Q101



### Applications

- Automotive Engine Control
- Powertrain Management
- Solenoid and Motor Drivers
- Electronic Transmission
- Distributed Power Architecture and VRMs
- Primary Switch for 12V Systems

### MOSFET Maximum Ratings $T_A = 25^\circ C$ unless otherwise noted

Symbol	Parameter	Ratings	Units
$V_{DSS}$	Drain to Source Voltage	40	V
$V_{GS}$	Gate to Source Voltage	$\pm 20$	V
$I_D$	Drain Current Continuous ( $V_{GS} = 10V$ )	50	A
	Pulsed	Figure 4	
$E_{AS}$	Single Pulse Avalanche Energy (Note 1)	144	mJ
$P_D$	Power Dissipation	79	W
	Derate above $25^\circ C$	0.53	W/ $^\circ C$
$T_J, T_{STG}$	Operating and Storage Temperature	-55 to +175	$^\circ C$
$R_{\theta JC}$	Thermal Resistance Junction to Case	1.9	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient, 1in <sup>2</sup> copper pad area	52	$^\circ C/W$

### Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDD8445	FDD8445-F085	TO-252AA	13"	12mm	2500 units

#### Notes:

1: Starting  $T_J = 25^\circ C$ ,  $L = 0.18mH$ ,  $I_{AS} = 40A$

2: A suffix as "...F085P" has been temporarily introduced in order to manage a double source strategy as ON Semiconductor has officially announced in Aug 2014.

FDD8445-F085 N-Channel PowerTrench® MOSFET

**Electrical Characteristics**  $T_A = 25^\circ\text{C}$  unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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**Off Characteristics**

$B_{V_{DS}}$	Drain to Source Breakdown Voltage	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	40	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 32\text{V},$ $V_{GS} = 0\text{V}$	-	-	1	$\mu\text{A}$
		$T_A = 150^\circ\text{C}$	-	-	250	
$I_{GSS}$	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{V}$	-	-	$\pm 100$	nA

**On Characteristics**

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\mu\text{A}$	2	2.8	4	V
$r_{DS(on)}$	Drain to Source On Resistance	$I_D = 50\text{A}, V_{GS} = 10\text{V}$	-	6.7	8.7	m $\Omega$
		$I_D = 50\text{A}, V_{GS} = 10\text{V}$ $T_J = 175^\circ\text{C}$	-	12.5	16.3	

**Dynamic Characteristics**

$C_{iss}$	Input Capacitance	$V_{DS} = 25\text{V}, V_{GS} = 0\text{V},$ $f = 1\text{MHz}$	-	3040	4050	pF	
$C_{oss}$	Output Capacitance		-	295	390	pF	
$C_{rss}$	Reverse Transfer Capacitance		-	178	270	pF	
$R_G$	Gate Resistance	$f = 1\text{MHz}$	-	1.7	-	$\Omega$	
$Q_{g(TOT)}$	Total Gate Charge at 10V	$V_{GS} = 0$ to 10V	$V_{DD} = 20\text{V}$ $I_D = 50\text{A}$	-	45	59	nC
$Q_{g(TH)}$	Threshold Gate Charge	$V_{GS} = 0$ to 2V		-	5.8	7.6	nC
$Q_{gs}$	Gate to Source Gate Charge			-	12.5	-	nC
$Q_{gd}$	Gate to Drain "Miller" Charge			-	10.5	-	nC

**Switching Characteristics**

$t_{on}$	Turn-On Time	$V_{DD} = 20\text{V}, I_D = 50\text{A}$ $V_{GS} = 10\text{V}, R_{GS} = 2\Omega$	-	-	138	ns
$t_{d(on)}$	Turn-On Delay Time		-	10	-	ns
$t_r$	Rise Time		-	82	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	26	-	ns
$t_f$	Fall Time		-	9.6	-	ns
$t_{off}$	Turn-Off Time		-	-	53	ns

**Drain-Source Diode Characteristics**

$V_{SD}$	Source to Drain Diode Voltage	$I_{SD} = 50\text{A}$	-	-	1.25	V
		$I_{SD} = 25\text{A}$	-	-	1.0	
$t_{rr}$	Reverse Recovery Time	$I_{SD} = 50\text{A}, dI_{SD}/dt = 100\text{A}/\mu\text{s}$	-	-	39	ns
$Q_{rr}$	Reverse Recovery Charge		-	-	38	nC

### Typical Characteristics

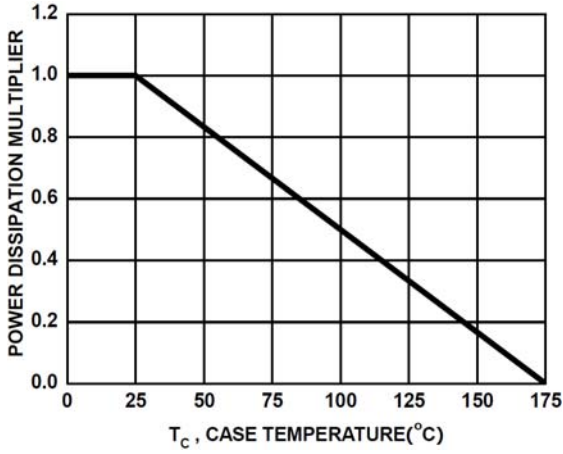


Figure 1. Normalized Power Dissipation vs Case Temperature

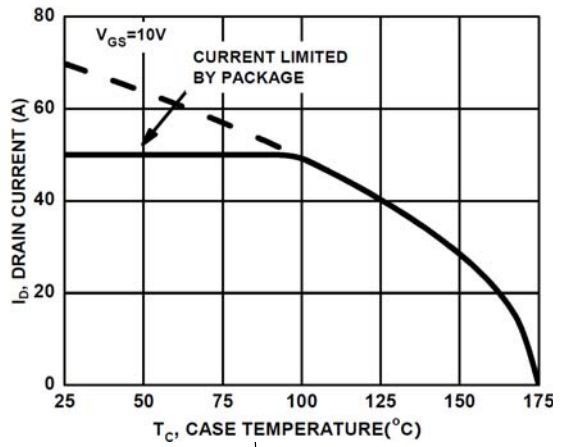


Figure 2. Maximum Continuous Drain Current vs Case Temperature

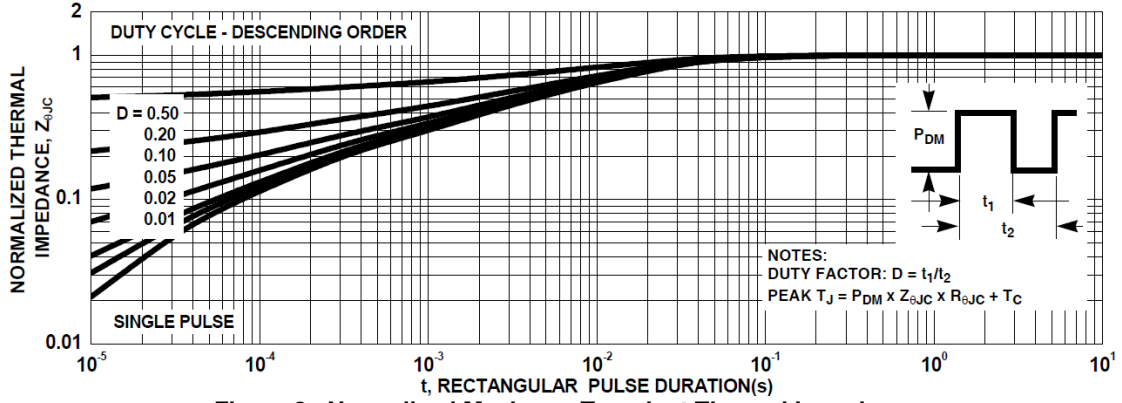


Figure 3. Normalized Maximum Transient Thermal Impedance

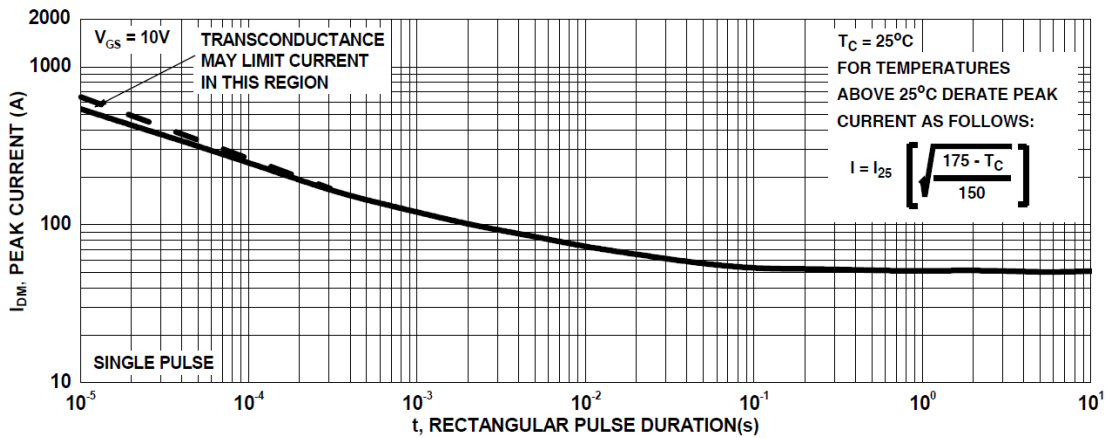


Figure 4. Peak Current Capability

### Typical Characteristics

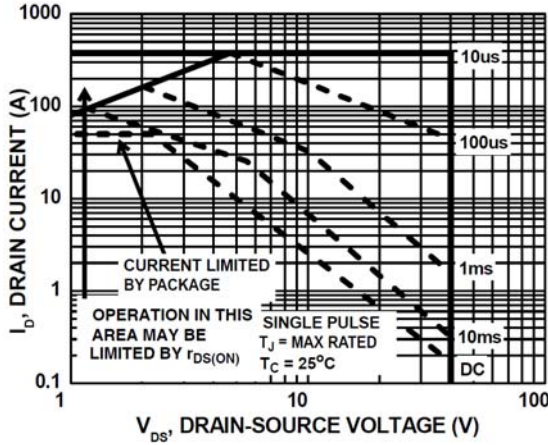


Figure 5. Forward Bias Safe Operating Area

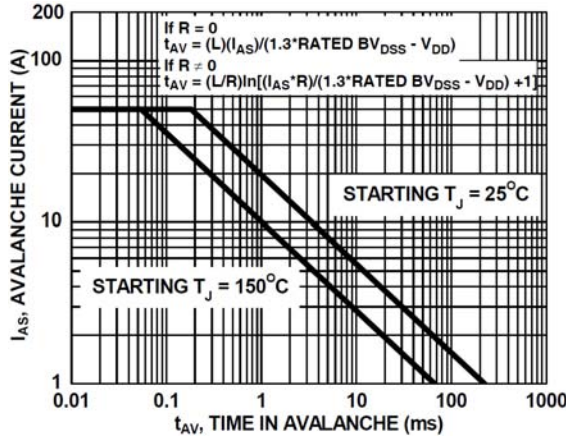


Figure 6. Unclamped Inductive Switching Capability

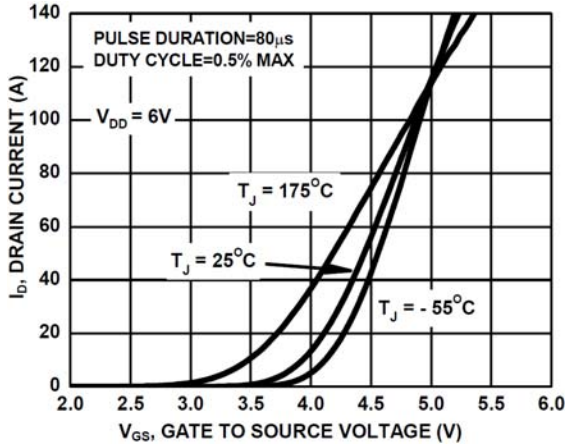


Figure 7. Transfer Characteristics

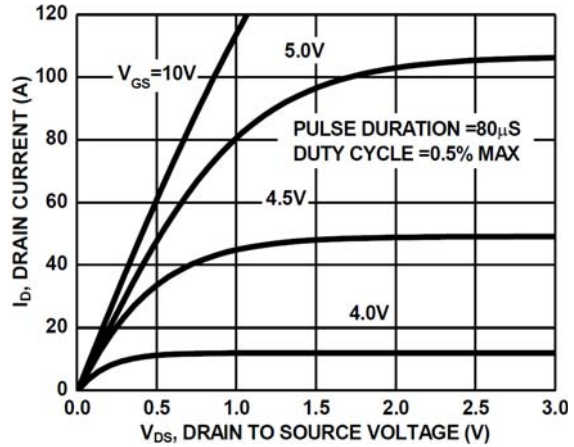


Figure 8. Saturation Characteristics

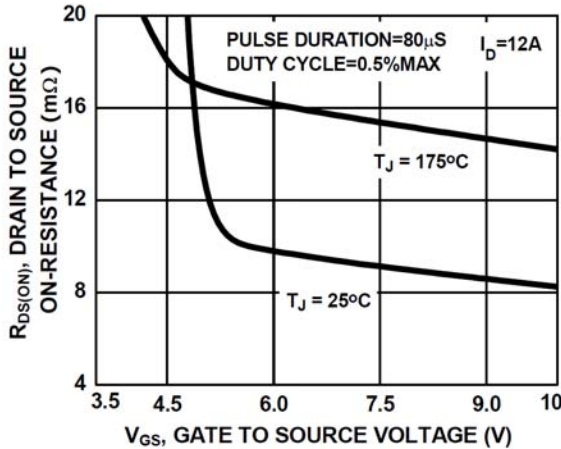


Figure 9. Drain to Source On-Resistance Variation vs Gate to Source Voltage

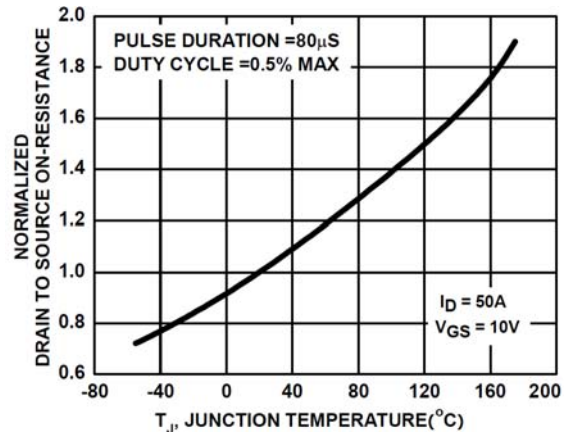
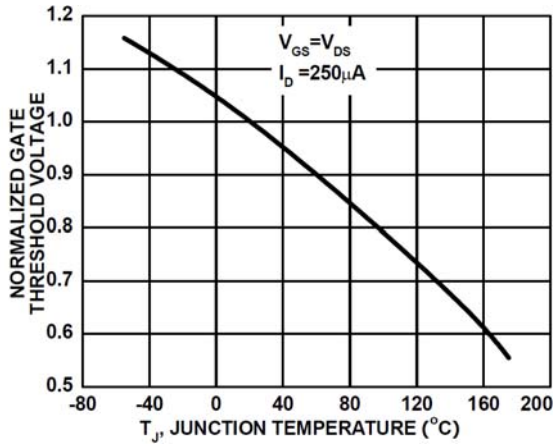
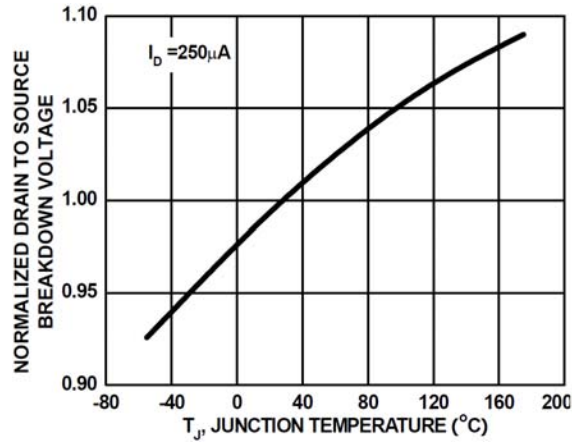


Figure 10. Normalized Drain to Source On-Resistance vs Junction Temperature

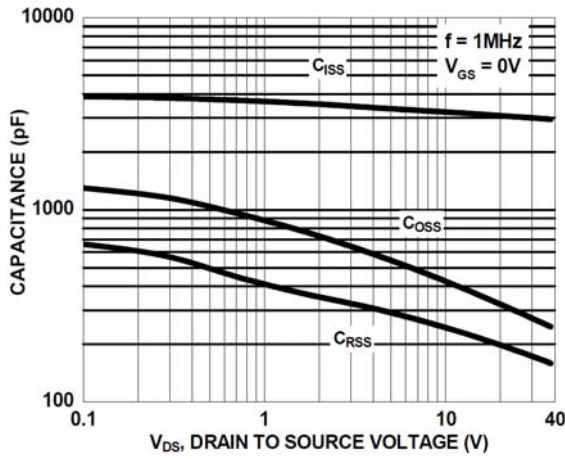
**Typical Characteristics**



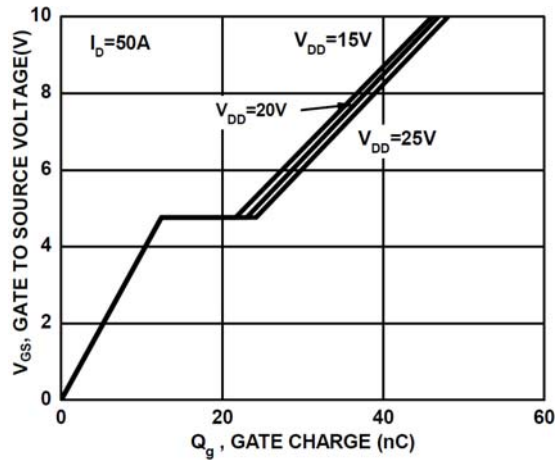
**Figure 11. Normalized Gate Threshold Voltage vs Junction Temperature**




**Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature**



**Figure 13. Capacitance vs Drain to Source Voltage**



**Figure 14. Gate Charge vs Gate to Source Voltage**

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