



ON Semiconductor®

## FDD8444-F085

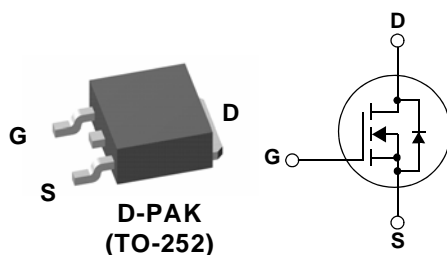
### N-Channel PowerTrench<sup>®</sup> MOSFET 40V, 50A, 5.2mΩ

#### Features

- Typ  $R_{DS(on)} = 4m\Omega$  at  $V_{GS} = 10V$ ,  $I_D = 50A$
- Typ  $Q_{g(10)} = 89nC$  at  $V_{GS} = 10V$ ,  $I_D = 50A$
- Low Miller Charge
- Low  $Q_{rr}$  Body Diode
- UIS Capability (Single Pulse/ Repetitive)
- 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)	535	mJ
$P_D$	Power Dissipation	153	W
	Derate above $25^\circ C$	1.02	W/ $^\circ C$
$T_J, T_{STG}$	Operating and Storage Temperature	-55 to +175	$^\circ C$
$R_{\theta JC}$	Thermal Resistance Junction to Case	0.98	$^\circ C/W$
$R_{\theta JA}$	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
FDD8444	FDD8444-F085	TO-252AA	13"	12mm	2500 units

#### Notes:

1: Starting  $T_J = 25^\circ C$ ,  $L = 0.67mH$ ,  $I_{AS} = 40A$

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

FDD8444-F085 N-Channel PowerTrench<sup>®</sup> 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	$V_{DS} = 32\text{V}$ , $V_{GS} = 0\text{V}$ $T_A = 150^\circ\text{C}$	-	-	1	$\mu\text{A}$
$I_{GSS}$	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	2.5	4	V
$r_{DS(on)}$	Drain to Source On Resistance	$I_D = 50\text{A}$ , $V_{GS} = 10\text{V}$	-	4	5.2	m $\Omega$
		$I_D = 50\text{A}$ , $V_{GS} = 10\text{V}$ $T_J = 175^\circ\text{C}$	-	7.2	9.4	

**Dynamic Characteristics**

$C_{iss}$	Input Capacitance	$V_{DS} = 25\text{V}$ , $V_{GS} = 0\text{V}$ , $f = 1\text{MHz}$	-	6195	-	pF
$C_{oss}$	Output Capacitance		-	585	-	pF
$C_{rss}$	Reverse Transfer Capacitance		-	332	-	pF
$R_G$	Gate Resistance	$f = 1\text{MHz}$	-	1.9	-	$\Omega$
$Q_{g(TOT)}$	Total Gate Charge at 10V	$V_{GS} = 0$ to 10V	$V_{DD} = 20\text{V}$ $I_D = 50\text{A}$	89	116	nC
$Q_{g(TH)}$	Threshold Gate Charge	$V_{GS} = 0$ to 2V		11	-	nC
$Q_{gs}$	Gate to Source Gate Charge			23	-	nC
$Q_{gd}$	Gate to Drain "Miller" Charge			20	-	nC

**Switching Characteristics**

$t_{on}$	Turn-On Time	$V_{DD} = 20\text{V}$ , $I_D = 50\text{A}$ $V_{GS} = 10\text{V}$ , $R_{GS} = 2\Omega$	-	-	135	ns
$t_{d(on)}$	Turn-On Delay Time		-	12	-	ns
$t_r$	Rise Time		-	78	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	48	-	ns
$t_f$	Fall Time		-	15	-	ns
$t_{off}$	Turn-Off Time		-	-	95	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	51	ns
$Q_{rr}$	Reverse Recovery Charge		-	45	59	nC

## Typical Characteristics

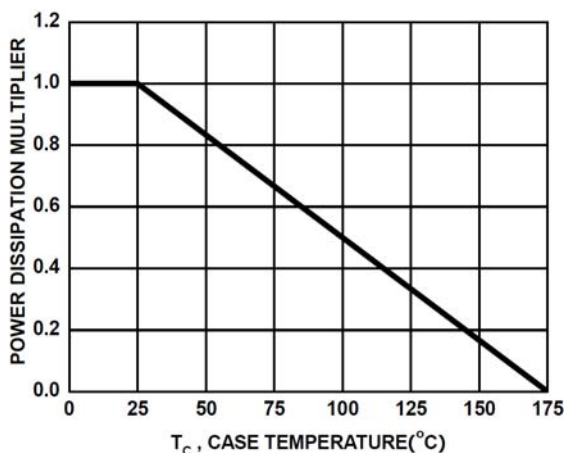


Figure 1. Normalized Power Dissipation vs Case Temperature

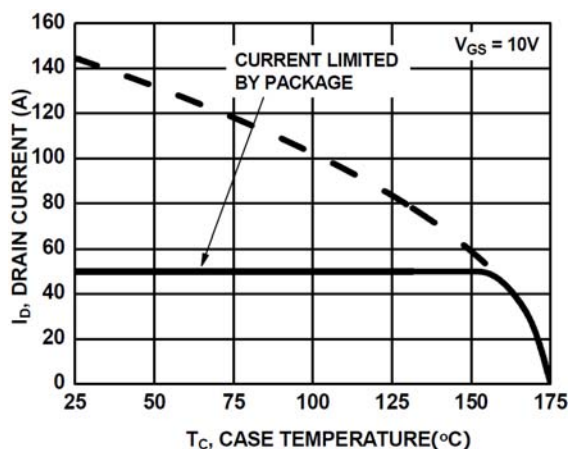


Figure 2. Maximum Continuous Drain Current vs Case Temperature

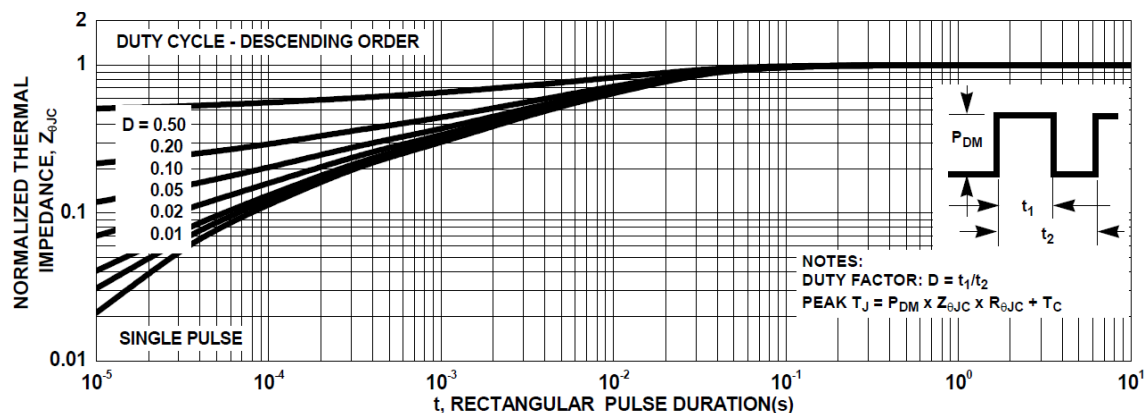


Figure 3. Normalized Maximum Transient Thermal Impedance

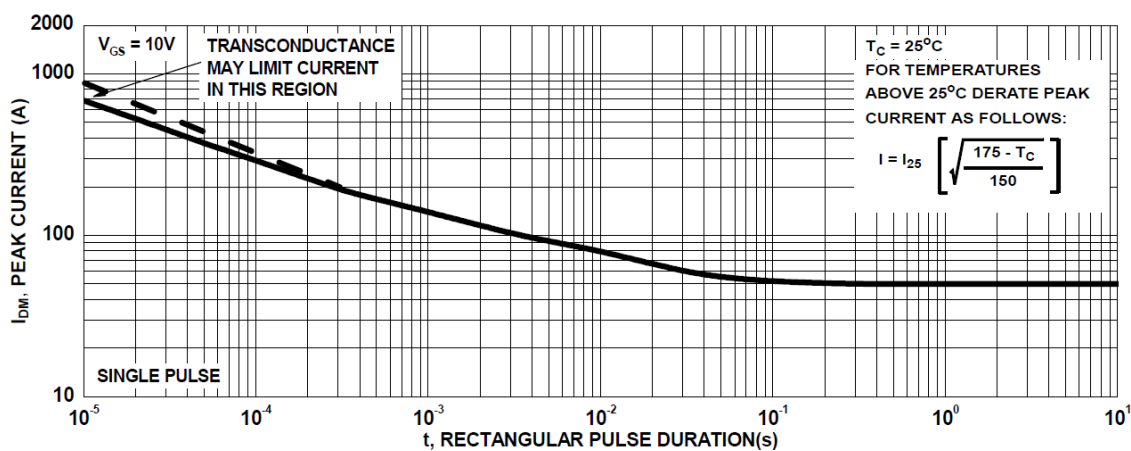


Figure 4. Peak Current Capability

## Typical Characteristics

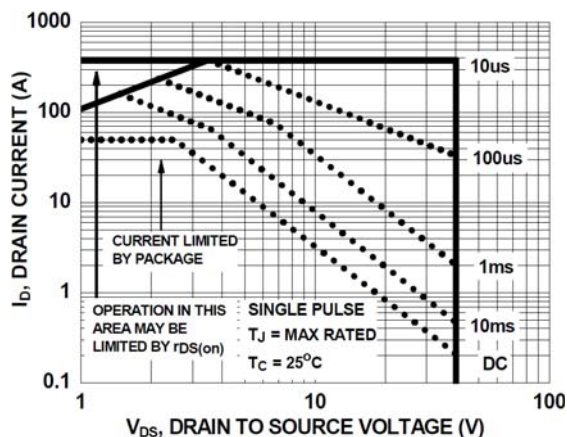
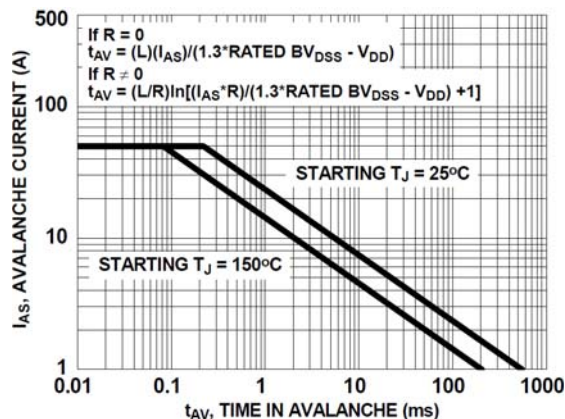


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to ON Semiconductor Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching Capability

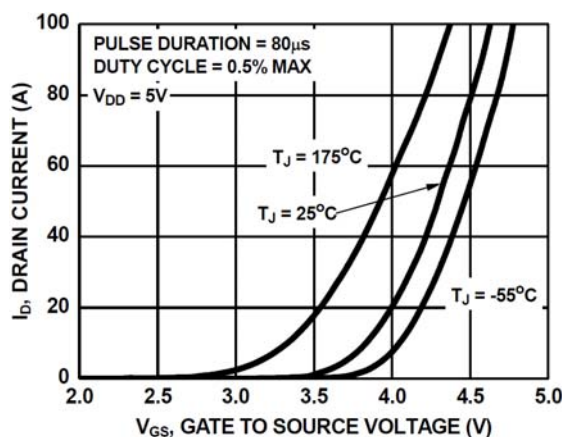


Figure 7. Transfer Characteristics

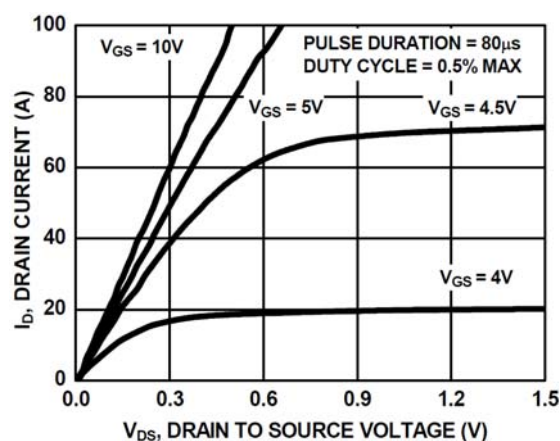


Figure 8. Saturation Characteristics

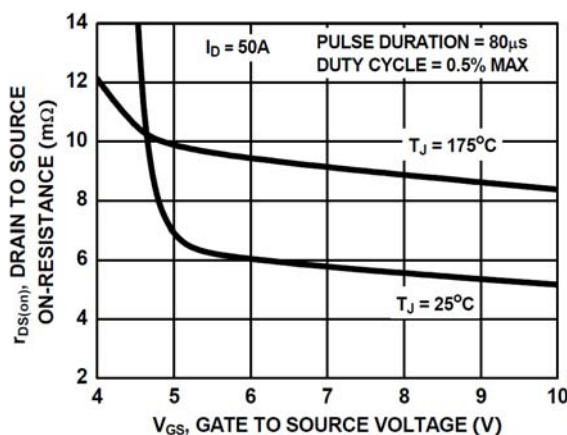


Figure 9. Drain to Source On-Resistance Variation vs Gate to Source Voltage

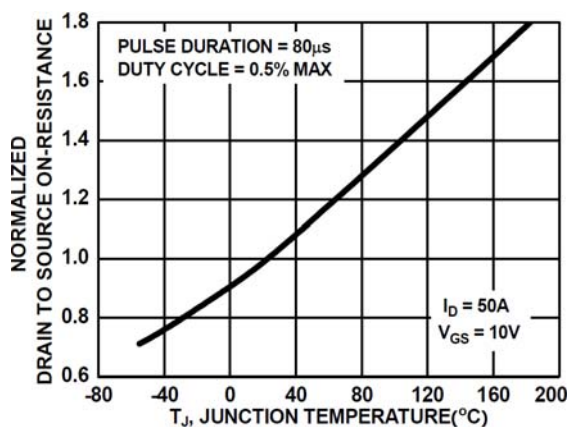


Figure 10. Normalized Drain to Source On-Resistance vs Junction Temperature

## Typical Characteristics

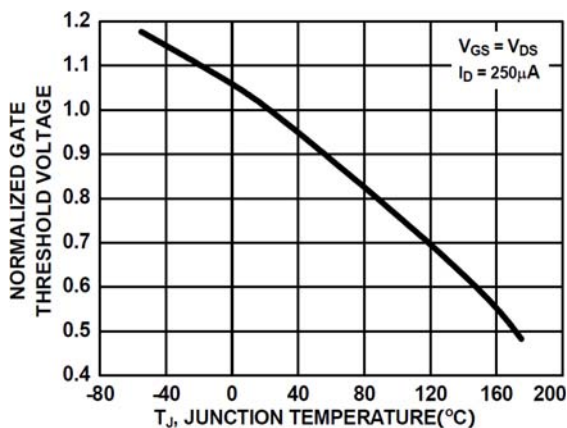


Figure 11. Normalized Gate Threshold Voltage vs Junction Temperature

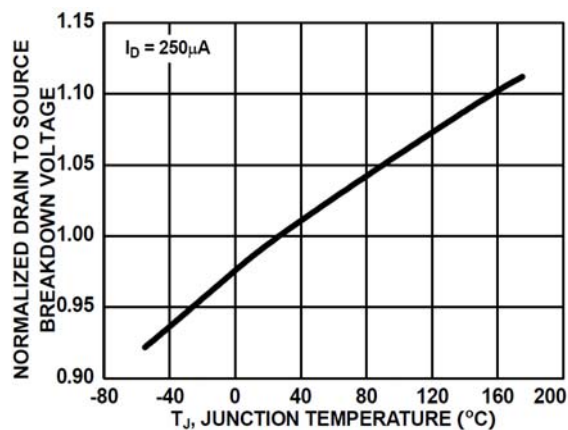


Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

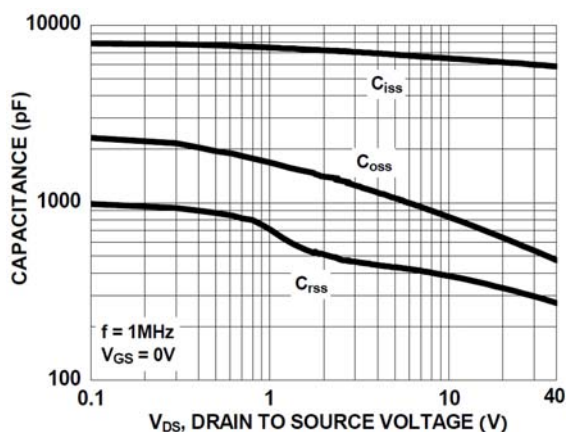


Figure 13. Capacitance vs Drain to Source Voltage

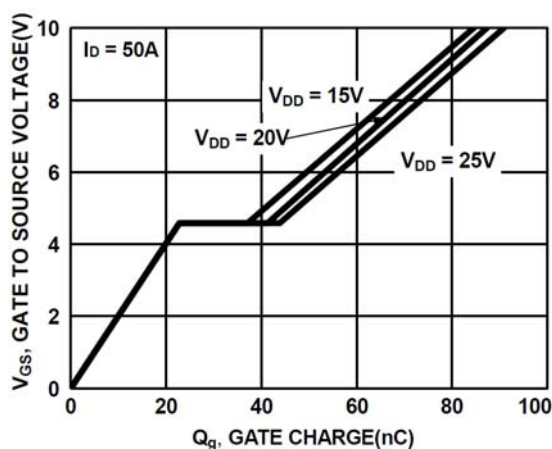



Figure 14. Gate Charge vs Gate to Source Voltage

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