



## FDP8441

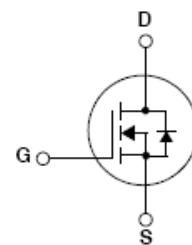
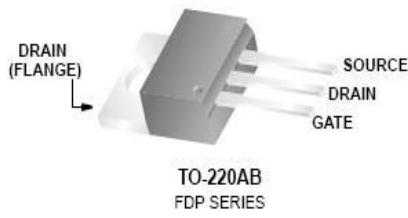
### N-Channel PowerTrench® MOSFET 40V, 80A, 2.7mΩ

#### Features

- Typ  $r_{DS(on)}$  = 2.1mΩ at  $V_{GS} = 10V$ ,  $I_D = 80A$
- Typ  $Q_g(10)$  = 215nC at  $V_{GS} = 10V$
- Low Miller Charge
- Low  $Q_{rr}$  Body Diode
- UIS Capability (Single Pulse and Repetitive Pulse)
- Qualified to AEC Q101
- RoHS Compliant

#### Applications

- Automotive Engine Control
- Powertrain Management
- Solenoid and Motor Drivers
- Electronic Steering
- Integrated Starter / Alternator
- Distributed Power Architectures and VRMs
- Primary Switch for 12V Systems



## MOSFET Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Ratings	Units
$V_{DS}$	Drain to Source Voltage	40	V
$V_{GS}$	Gate to Source Voltage	$\pm 20$	V
$I_D$	Drain Current Continuous ( $T_C < 160^\circ\text{C}$ , $V_{GS} = 10\text{V}$ )	80	A
	Continuous ( $T_{amb} = 25^\circ\text{C}$ , $V_{GS} = 10\text{V}$ , with $R_{0JA} = 62^\circ\text{C/W}$ )	23	
	Pulsed	See Figure 4	
$E_{AS}$	Single Pulse Avalanche Energy	(Note 1)	947 mJ
$P_D$	Power dissipation	300	W
	Derate above $25^\circ\text{C}$	2	$^\circ\text{C}/\text{W}$
$T_J$ , $T_{STG}$	Operating and Storage Temperature	-55 to 175	$^\circ\text{C}$

## Thermal Characteristics

$R_{0JC}$	Thermal Resistance Junction to Case	0.5	$^\circ\text{C/W}$
$R_{0JA}$	Thermal Resistance Junction to Ambient	(Note 2)	62 $^\circ\text{C/W}$

## Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDP8441	FDP8441	TO-220AB	Tube	N/A	50 units

## Electrical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted

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

$B_{VDSS}$	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	$V_{DS} = 32\text{V}$	-	-	1	$\mu\text{A}$
		$V_{GS} = 0\text{V}$ $T_J = 150^\circ\text{C}$	-	-	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	$V_{DS} = V_{GS}$ , $I_D = 250\mu\text{A}$	2	2.8	4	V
$r_{DS(on)}$	Drain to Source On Resistance	$I_D = 80\text{A}$ , $V_{GS} = 10\text{V}$	-	2.1	2.7	$\text{m}\Omega$
		$I_D = 80\text{A}$ , $V_{GS} = 10\text{V}$ , $T_J = 175^\circ\text{C}$	-	3.6	4.7	

### Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = 25\text{V}$ , $V_{GS} = 0\text{V}$ , $f = 1\text{MHz}$	-	15000	-	pF	
$C_{oss}$	Output Capacitance		-	1250	-	pF	
$C_{rss}$	Reverse Transfer Capacitance		-	685	-	pF	
$R_G$	Gate Resistance	$V_{GS} = 0.5\text{V}$ , $f = 1\text{MHz}$	-	1.1	-	$\Omega$	
$Q_{g(TOT)}$	Total Gate Charge at 10V	$V_{GS} = 0$ to $10\text{V}$	-	215	280	nC	
$Q_{g(TH)}$	Threshold Gate Charge	$V_{GS} = 0$ to $2\text{V}$	$V_{DD} = 20\text{V}$ $I_D = 35\text{A}$ $I_g = 1\text{mA}$	-	29	38	nC
$Q_{gs}$	Gate to Source Gate Charge	-		60	-	nC	
$Q_{gs2}$	Gate Charge Threshold to Plateau	-		32	-	nC	
$Q_{gd}$	Gate to Drain "Miller" Charge	-		49	-	nC	

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

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

$t_{(\text{on})}$	Turn-On Time	$V_{DD} = 20\text{V}, I_D = 35\text{A}$ $V_{GS} = 10\text{V}, R_{GS} = 1.5\Omega$	-	-	77	ns
$t_{d(\text{on})}$	Turn-On Delay Time		-	23	-	ns
$t_r$	Turn-On Rise Time		-	24	-	ns
$t_{d(\text{off})}$	Turn-Off Delay Time		-	75	-	ns
$t_f$	Turn-Off Fall Time		-	17.9	-	ns
$t_{\text{off}}$	Turn-Off Time		-	-	147	ns

**Drain-Source Diode Characteristics**

$V_{SD}$	Source to Drain Diode Voltage	$I_{SD} = 35\text{A}$	-	0.8	1.25	V
		$I_{SD} = 15\text{A}$	-	0.8	1.0	V
$t_{rr}$	Reverse Recovery Time	$I_F = 35\text{A}, di/dt = 100\text{A}/\mu\text{s}$	-	52	68	ns
$Q_{rr}$	Reverse Recovery Charge	$I_F = 35\text{A}, di/dt = 100\text{A}/\mu\text{s}$	-	76	99	nC

**Notes:**

- 1: Starting  $T_J = 25^\circ\text{C}$ ,  $L = 0.46\text{mH}$ ,  $I_{AS} = 64\text{A}$ .  
2: Pulse width = 100s.

## Typical Characteristics

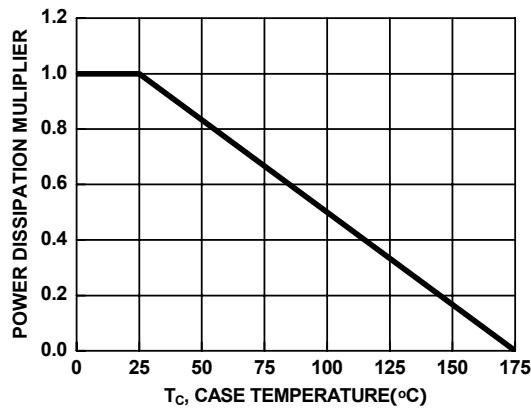


Figure 1. Normalized Power Dissipation vs Case Temperature

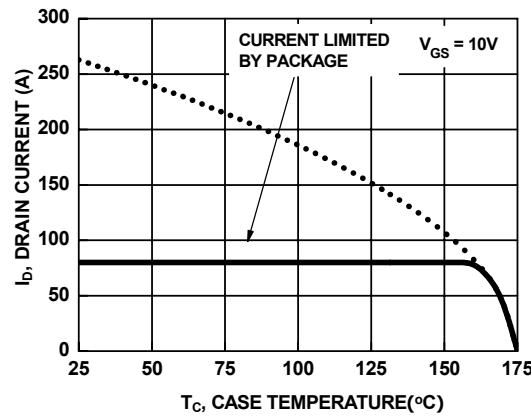


Figure 2. Maximum Continuous Drain Current vs Case Temperature

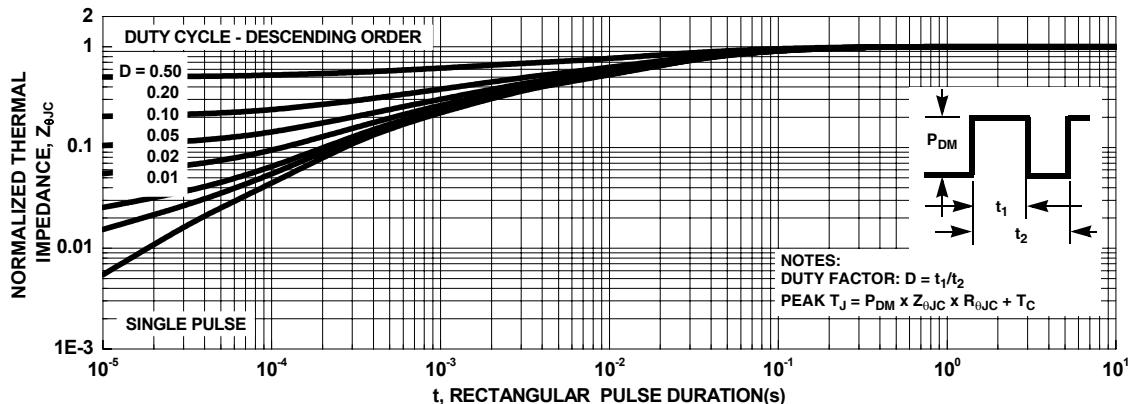


Figure 3. Normalized Maximum Transient Thermal Impedance

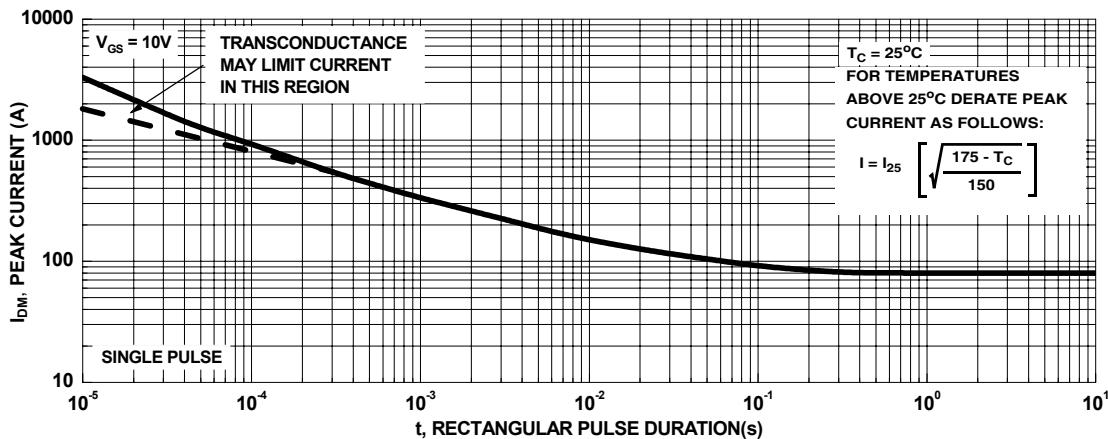


Figure 4. Peak Current Capability