

March 2009

FDP8443_F085

N-Channel PowerTrench[®] MOSFET

40V, 80A, 3.5mΩ

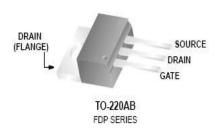
Features

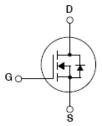
- Typ $r_{DS(on)}$ = 2.7m Ω at V_{GS} = 10V, I_D = 80A
- Typ $Q_{q(10)}$ = 142nC at V_{GS} = 10V
- Low Miller Charge
- Low Q_{rr} Body Diode
- UIS Capability (Single Pulse and Repetitive Pulse)
- Qualified to AEC Q101
- RoHS Compliant

Applications

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







Units

$\textbf{MOSFET Maximum Ratings} \ \, \textbf{T}_{C} = 25^{\circ}\text{C unless otherwise noted}$

Symbol	Parameter		Ratings	Units
V_{DSS}	Drain to Source Voltage		40	V
V_{GS}	Gate to Source Voltage		±20	V
	Drain Current Continuous (T _C < 144°C, V _{GS} = 10V)		80	
I_D	Continuous ($T_{amb} = 25^{\circ}C$, $V_{GS} = 10V$, with $R_{\theta,JA} = 62^{\circ}C/W$)		20	Α
	Pulsed		See Figure 4	
E _{AS}	Single Pulse Avalanche Energy (I	Note 1)	531	mJ
П	Power Dissipation		188	W
P_{D}	Derate above 25°C		1.25	W/°C
T _J , T _{STG}	Operating and Storage Temperature		-55 to +175	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance Junction to Case		0.8	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	(Note 2)	62	°C/W

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDP8443	FDP8443_F085	TO-220AB	Tube	N/A	50 units

Electrical Characteristics $T_C = 25^{\circ}C$ unless otherwise noted

Parameter

Off Ch	Off Characteristics						
B _{VDSS}	Drain to Source Breakdown Voltage	$I_D = 250 \mu A, V_{GS} = 0$	V	40	-	-	V
	Zara Cata Voltaga Drain Current	$V_{DS} = 32V$,		-	-	1	
I _{DSS} Zero Gate Voltage Drain Current	$V_{GS} = 0V$	$T_{\rm C} = 150^{\rm o}{\rm C}$	-	-	250	μА	
I _{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20V$		-	-	±100	nA

Test Conditions

Min

Тур

On Characteristics

Symbol

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_{D} = 250 \mu A$	2	2.8	4	V
		$I_D = 80A, V_{GS} = 10V$	ı	2.7	3.5	
r _{DS(on)}	r _{DS(on)} Drain to Source On Resistance	$I_D = 80A, V_{GS} = 10V,$ $T_J = 175$ °C	-	4.7	6.1	mΩ

Dynamic Characteristics

C _{iss}	Input Capacitance	V 05V V 0	N. /	-	9310	-	pF
Coss	Output Capacitance	V _{DS} = 25V, V _{GS} = 0 f = 1MHz	$V_{DS} = 25V, V_{GS} = 0V,$		800	-	pF
C _{rss}	Reverse Transfer Capacitance	I = IIVIDZ		-	510	-	pF
R_G	Gate Resistance	$V_{GS} = 0.5V, f = 1MI$	Нz	-	0.9	-	Ω
$Q_{g(TOT)}$	Total Gate Charge at 10V	V _{GS} = 0 to 10V		-	142	185	nC
$Q_{g(TH)}$	Threshold Gate Charge	V _{GS} = 0 to 2V	V _{DD} = 20V	-	17.5	23	nC
Q _{gs}	Gate to Source Gate Charge		I _D = 35A	-	36	-	nC
Q _{gs2}	Gate Charge Threshold to Plateau		$I_g = 1mA$	-	18.8	-	nC
Q_{gd}	Gate to Drain "Miller" Charge			-	32	-	nC

Electrical Characteristics $T_C = 25^{\circ}C$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Тур	Max	Units

Switching Characteristics ($V_{GS} = 10V$)

t _{on}	Turn-On Time		1	-	58	ns
t _{d(on)}	Turn-On Delay Time		-	18.4	-	ns
t _r	Rise Time	$V_{DD} = 20V, I_D = 35A$ $V_{GS} = 10V, R_{GS} = 2\Omega$	-	17.9	-	ns
t _{d(off)}	Turn-Off Delay Time	V _{GS} = 10V, K _{GS} = 252	-	55	-	ns
t _f	Fall Time		-	13.5	-	ns
t _{off}	Turn-Off Time		-	-	109	ns

Drain-Source Diode Characteristics

V _{SD} Source to Drain Diode Voltage	Source to Drain Diade Voltage	-	0.8	1.25	\/	
	I _{SD} = 15A	-	0.8	1.0	V	
t _{rr}	Reverse Recovery Time	1 - 35A dl /dt - 100A/	-	42	55	ns
Q _{rr}	Reverse Recovery Charge	$I_{SD} = 35A$, $dI_{SD}/dt = 100A/\mu s$	-	48	62	nC

1: Starting T_J = 25°C, L = 0.26mH, I_{AS} = 64A. 2: Pulse width = 100s.

This product has been designed to meet the extreme test conditions and environment demanded by the automotive industry. For a copy of the requirements, see AEC Q101 at: http://www.aecouncil.com/
All Fairchild Semiconductor products are manufactured, assembled and tested under ISO9000 and QS9000 quality systems certification.

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175

150

Typical Characteristics 200 **CURRENT LIMITED** $V_{GS} = 10V$ BY PACKAGE € 160 DRAIN CURRENT 120 80 ف 40 0

25

50

Figure 1. Normalized Power Dissipation vs Case **Temperature**

T_C, CASE TEMPERATURE(°C)

100

0.0

0

25

Figure 2. Maximum Continuous Drain Current vs **Case Temperature**

75

100

T_C, CASE TEMPERATURE(°C)

125

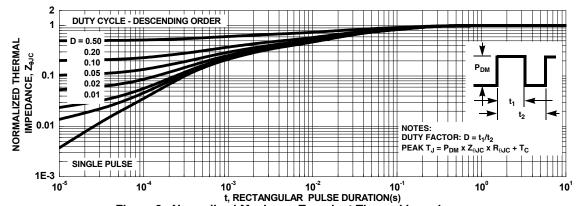


Figure 3. Normalized Maximum Transient Thermal Impedance

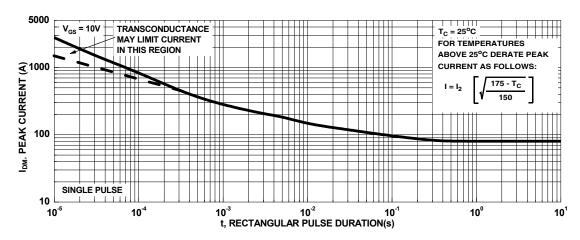


Figure 4. Peak Current Capability

Typical Characteristics

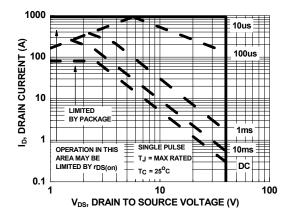
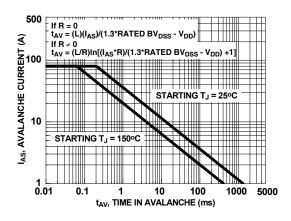


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to Fairchild Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching

Capability

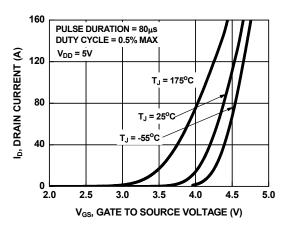


Figure 7. Transfer Characteristics

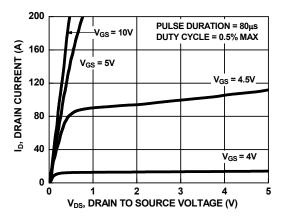


Figure 8. Saturation Characteristics

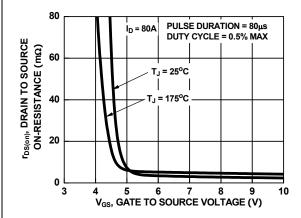


Figure 9. Drain to Source On-Resistance Variation vs Gate to Source Voltage

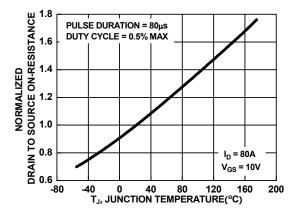


Figure 10. Normalized Drain to Source On Resistance vs Junction Temperature

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Typical Characteristics

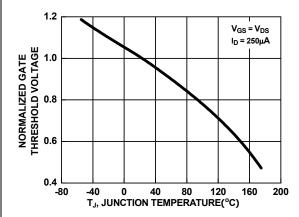


Figure 11. Normalized Gate Threshold Voltage vs Junction Temperature

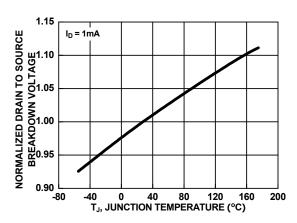


Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

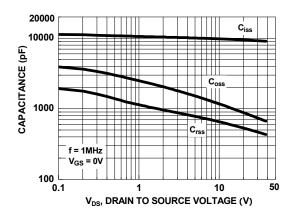


Figure 13. Capacitance vs Drain to Source Voltage

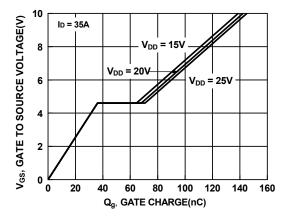


Figure 14. Gate Charge vs Gate to Source Voltage





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