FAIRCHILD SEMICONDUCTOR®

June 2011

FDB8443

N-Channel PowerTrench® MOSFET

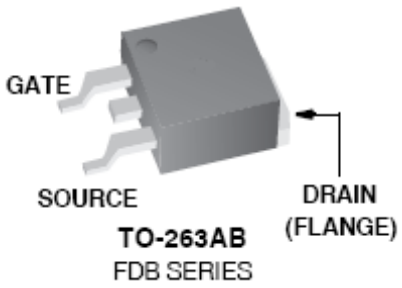
40V, 182A, 3.0mΩ

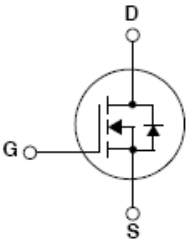
Features

- Typ $r_{DS(on)}$ = 2.3mΩ at V_{GS} = 10V, I_D = 80A
- Typ $Q_{g(10)}$ = 142nC at V_{GS} = 10V
- Low Miller Charge
- Low Q_{rr} Body Diode
- UIS Capability (Single Pulse and Repetitive Pulse)
- RoHS Compliant

Applications

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





MOSFET Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V_{DSS}	Drain to Source Voltage		40	V
V_{GS}	Gate to Source Voltage		±20	V
I_D	Drain Current	- Continuous (T_C = 25°C, Silicon Limited)	182*	A
		- Continuous (T_C = 100°C, Silicon Limited)	129*	
		- Continuous (T_C = 25°C, Package Limited)	120	
		- Continuous (T_A = 25°C, $R_{\theta JA}$ = 43°C/W)	25	
I_{DM}	Drain Current	- Pulsed	See Figure 4	
E_{AS}	Single Pulse Avalanche Energy (Note 1)		531	mJ
P_D	Power Dissipation		188	W
	Derate above 25°C		1.25	W/°C
T_J, T_{STG}	Operating and Storage Temperature		-55 to +175	°C

*Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 120A.

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
$R_{\theta JA}$	Thermal Resistance Junction to Ambient TO-263, 1in^2 copper pad area	43	°C/W

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDB8443	FDB8443	TO-263AB	330mm	24mm	800 units

Electrical Characteristics T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
B_{VDSS}	Drain to Source Breakdown Voltage	I_D = 250μA, V_{GS} = 0V	40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 32V, V_{GS} = 0V	-	-	1	μA
		V_{DS} = 32V, V_{GS} = 0V, T_C = 150°C	-	-	250	
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±20V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 250μA	2	2.8	4	V
$r_{DS(on)}$	Drain to Source On Resistance	I_D = 80A, V_{GS}= 10V	-	2.3	3.0	mΩ
		I_D = 80A, V_{GS}= 10V, T_J = 175°C	-	4.2	5.5	
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1MHz	-	9310	-	pF
C_{oss}	Output Capacitance		-	800	-	pF
C_{rss}	Reverse Transfer Capacitance		-	510	-	pF
R_G	Gate Resistance	V_{GS} = 0.5V, f = 1MHz	-	0.9	-	Ω
$Q_{g(TOT)}$	Total Gate Charge at 10V	V_{GS} = 0 to 10V, V_{DD} = 20V, I_D = 35A, I_g = 1mA	-	142	185	nC
$Q_{g(TH)}$	Threshold Gate Charge	V_{GS} = 0 to 2V, V_{DD} = 20V, I_D = 35A, I_g = 1mA	-	17.5	23	nC
Q_{gs}	Gate to Source Gate Charge	V_{DD} = 20V, I_D = 35A, I_g = 1mA	-	36	-	nC
Q_{gs2}	Gate Charge Threshold to Plateau	V_{DD} = 20V, I_D = 35A, I_g = 1mA	-	18.8	-	nC
Q_{gd}	Gate to Drain “Miller“ Charge	V_{DD} = 20V, I_D = 35A, I_g = 1mA	-	32	-	nC

Electrical Characteristics T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units

Switching Characteristics (V_{GS} = 10V)

t_{on}	Turn-On Time	V_{DD} = 20V, I_D = 35A V_{GS} = 10V, R_{GS} = 2Ω	-	-	58	ns
$t_{d(on)}$	Turn-On Delay Time		-	18.4	-	ns
t_r	Rise Time		-	17.9	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	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	I_{SD} = 35A	-	0.8	1.25	V
		I_{SD} = 15A	-	0.8	1.0	
t_{rr}	Reverse Recovery Time	I_{SD} = 35A, dI_{SD}/dt = 100A/μs	-	42	55	ns
Q_{rr}	Reverse Recovery Charge		-	48	62	nC

Notes:

1: Starting T_J = 25°C, L = 0.26mH, I_{AS} = 64A.

2: Pulse width = 100s.

Typical Characteristics

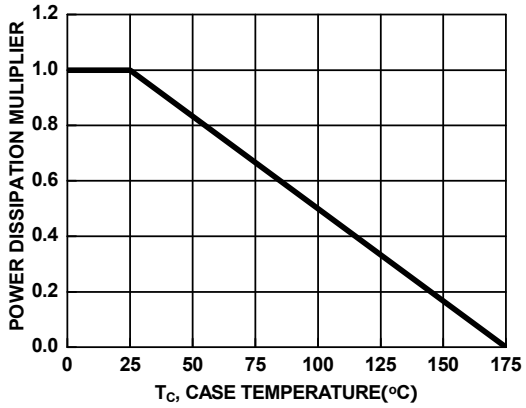


Figure 1. Normalized Power Dissipation vs Case Temperature

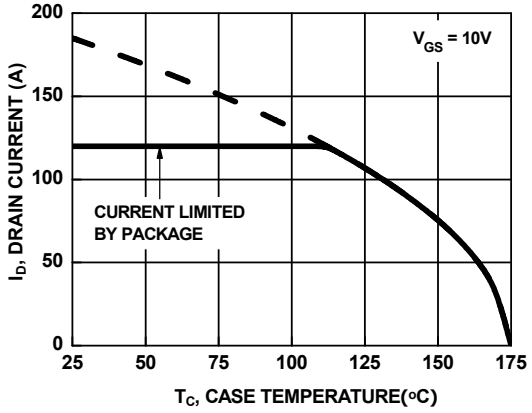


Figure 2. Maximum Continuous Drain Current vs Case Temperature

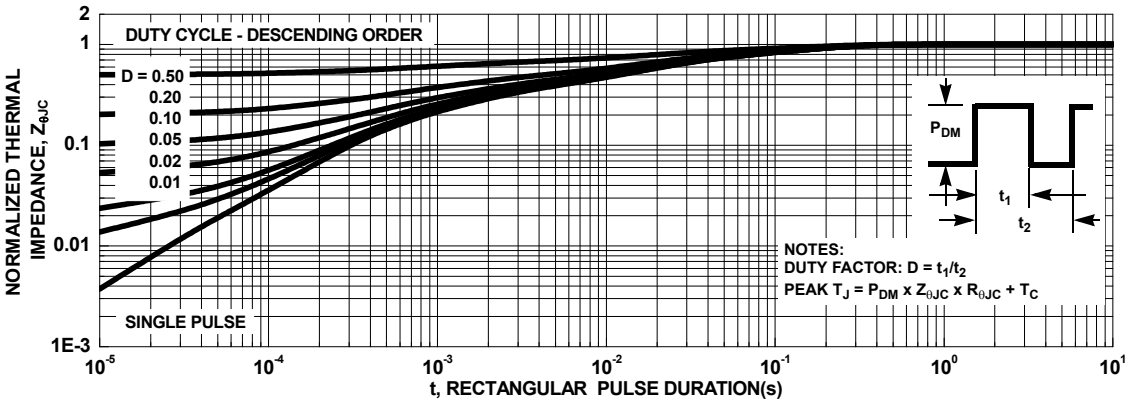


Figure 3. Normalized Maximum Transient Thermal Impedance

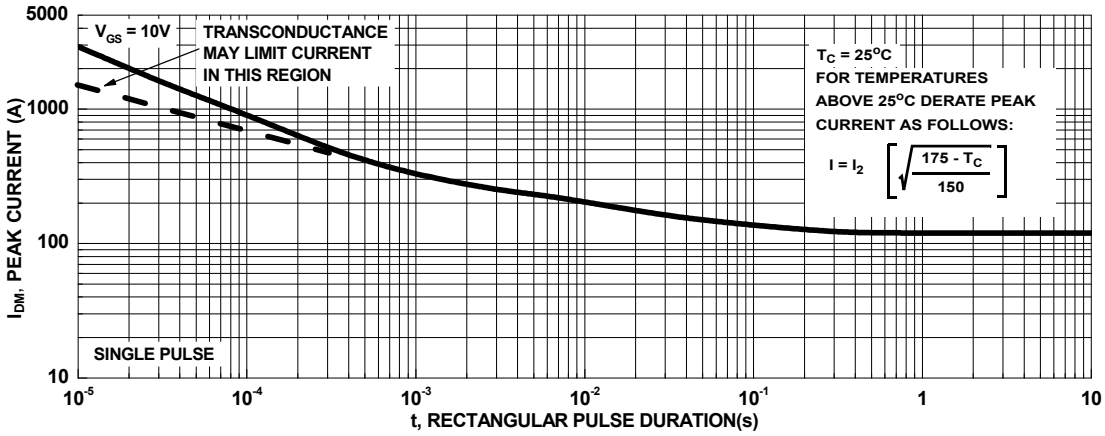


Figure 4. Peak Current Capability

Typical Characteristics

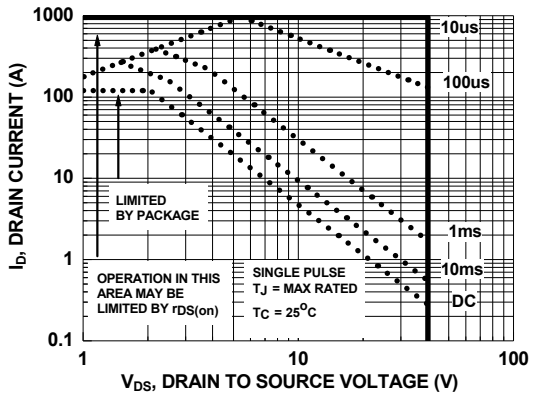
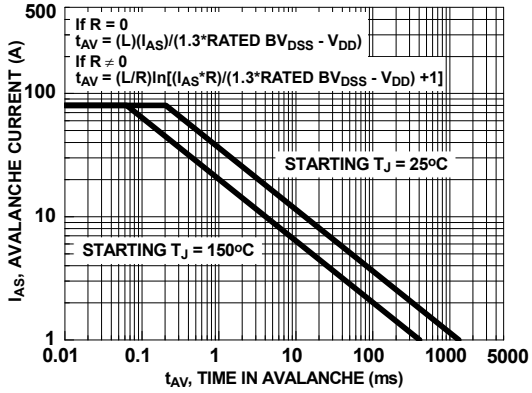


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to Fairchild Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching Capability

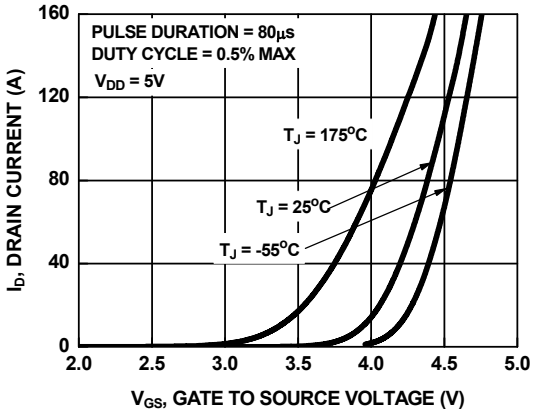


Figure 7. Transfer Characteristics

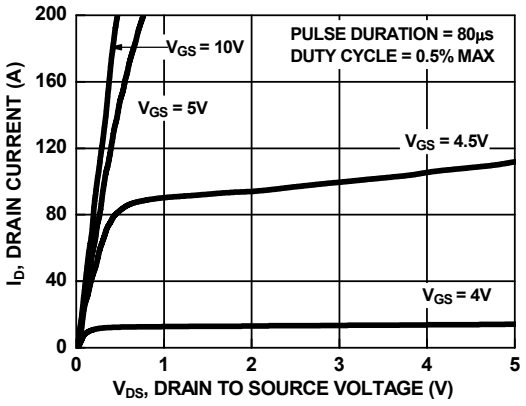


Figure 8. Saturation Characteristics

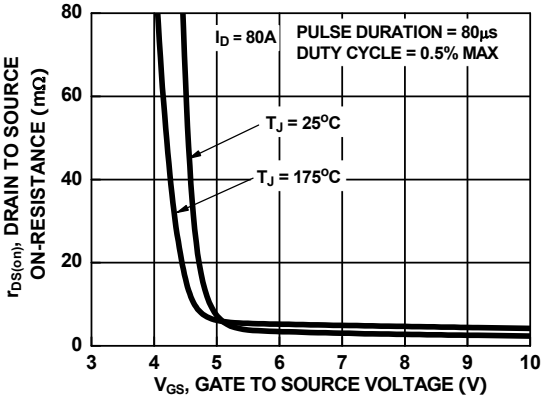


Figure 9. Drain to Source On-Resistance Variation vs Gate to Source Voltage

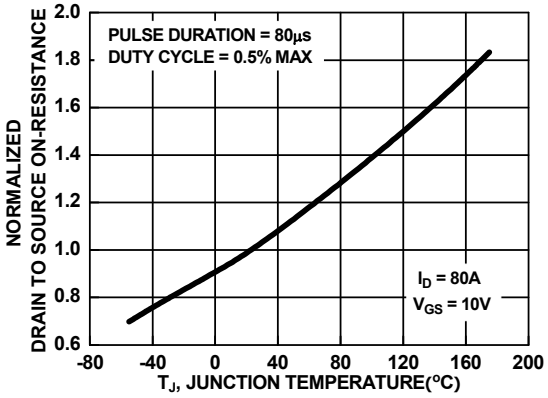


Figure 10. Normalized Drain to Source On Resistance vs Junction Temperature

Typical Characteristics

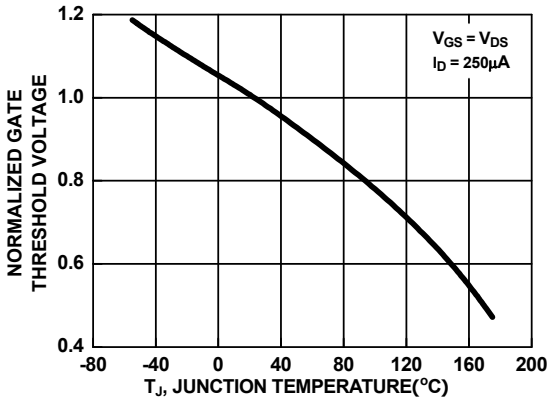


Figure 11. Normalized Gate Threshold Voltage vs Junction Temperature

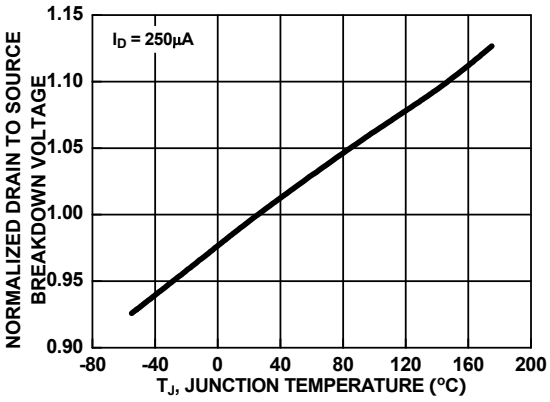


Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

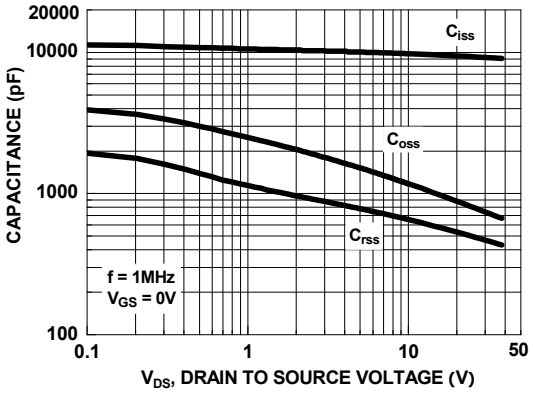


Figure 13. Capacitance vs Drain to Source Voltage

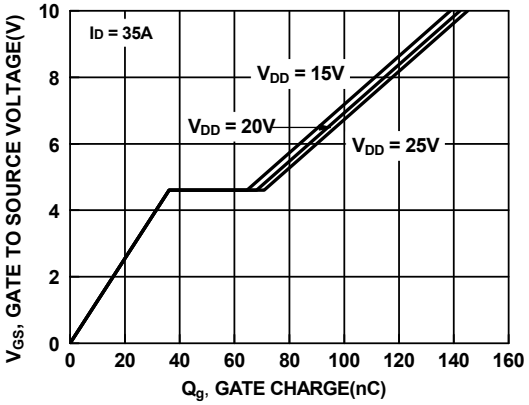


Figure 14. Gate Charge vs Gate to Source Voltage

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