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January 2006

FDB8445

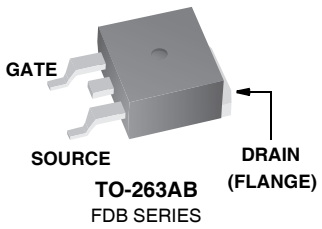
N-Channel PowerTrench® MOSFET
40V, 70A, 9mΩ

Features

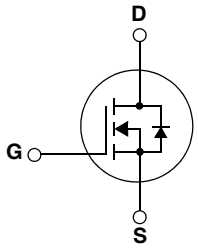
- Typ $r_{DS(on)}$ = 6.8mΩ at V_{GS} = 10V, I_D = 70A
- Typ $Q_{g(10)}$ = 44nC at V_{GS} = 10V
- Low Miller Charge
- Low Q_{rr} Body Diode
- UIS Capability (Single Pulse/ Repetitive Pulse)
- Qualified to AEC Q101
- RoHS Compliant

Applications

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



TO-263AB
FDB SERIES



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Absolute 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 (V_{GS} = 10V)	(Note 1)	70	A
	Pulsed		Figure 4	
E_{AS}	Single Pulse Avalanche Energy	(Note 2)	102	mJ
P_D	Power Dissipation		92	W
	Derate above 25°C		0.6	W/°C
T_J, T_{STG}	Operating and Storage Temperature		-55 to +175	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.63	°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
FDB8445	FDB8445	TO-263AB	330mm	24mm	800 units

Electrical Characteristics T_J = 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
			T_J =150°C	-	-	250	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±20V		-	-	±100	nA
On Characteristics							
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA		2	2.5	4	V
$r_{DS(on)}$	Drain to Source On Resistance	I_D = 70A, V_{GS} = 10V		-	6.8	9	mΩ
		I_D = 70A, V_{GS} = 10V, T_J = 175°C		-	13	17.2	mΩ
Dynamic Characteristics							
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1MHz		-	2860	3805	pF
C_{oss}	Output Capacitance			-	295	395	pF
C_{rss}	Reverse Transfer Capacitance			-	180	270	pF
R_G	Gate Resistance	f = 1MHz		-	1.95	-	W
$Q_{g(TOT)}$	Total Gate Charge at 10V	V_{GS} = 0 to 10V	V_{DS}= 20V, I_D = 70A,	-	44	62	nC
$Q_{g(TH)}$	Threshold Gate Charge	V_{GS} = 0 to 2V		-	2.9	4.1	nC
Q_{gs}	Gate to Source Gate Charge			-	11	-	nC
Q_{gs2}	Gate Charge Threshold to Plateau			-	8.2	-	nC
Q_{gd}	Gate to Drain Charge			-	11	-	nC

Electrical Characteristics T_J = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Switching Characteristics						
$t_{(on)}$	Turn-On Time	V_{DD} = 20V, I_D = 70A V_{GS} = 10V, R_{GS} = 5Ω	-	-	45	ns
$t_{d(on)}$	Turn-On Delay Time		-	10	-	ns
t_r	Turn-On Rise Time		-	19	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	36	-	ns
t_f	Turn-Off Fall Time		-	16	-	ns
t_{off}	Turn-Off Time		-	-	81	ns
Drain-Source Diode Characteristics						
V_{SD}	Source to Drain Diode Voltage	I_{SD} = 70A	-	-	1.25	V
		I_{SD} = 35A	-	-	1.0	V
t_{rr}	Reverse Recovery Time	I_F = 70A, di/dt = 100A/μs	-	-	59	ns
Q_{rr}	Reverse Recovery Charge	I_F = 70A, di/dt = 100A/μs	-	-	77	nC

Notes:
1: Maximum wire current carrying capacity is 70A.
2: Starting T_J = 25°C, L = 65μH, I_{AS} = 56A.

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.

Typical Characteristics

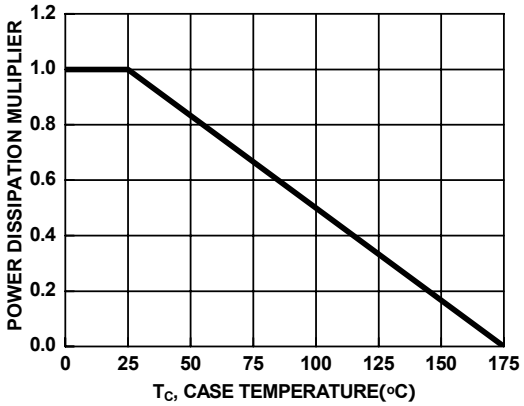


Figure 1. Normalized Power Dissipation vs Case Temperature

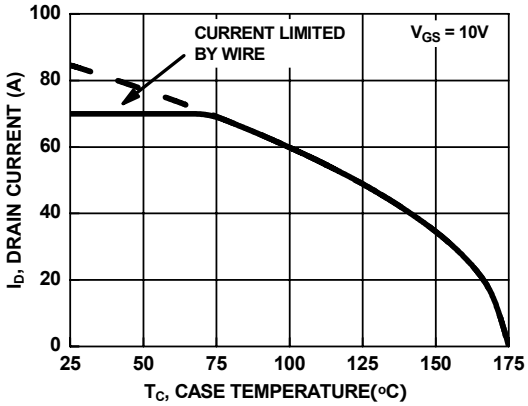


Figure 2. Maximum Continuous Drain Current vs Case Temperature

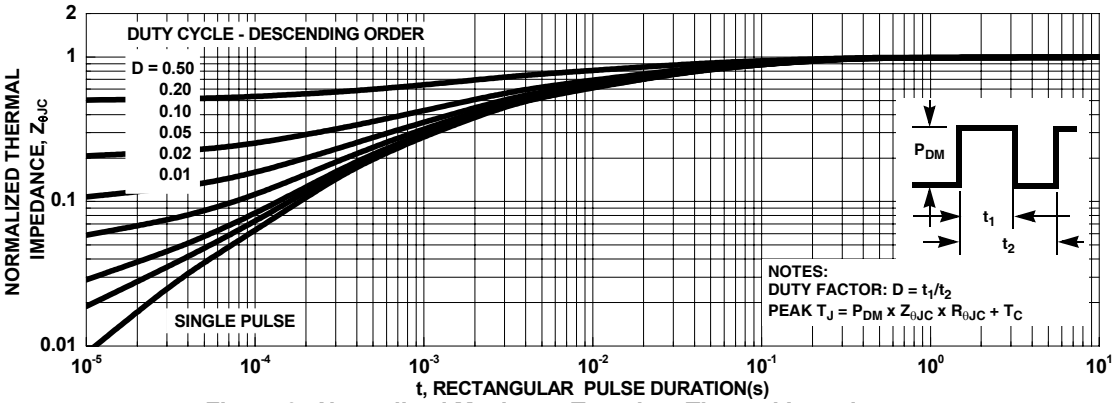


Figure 3. Normalized Maximum Transient Thermal Impedance

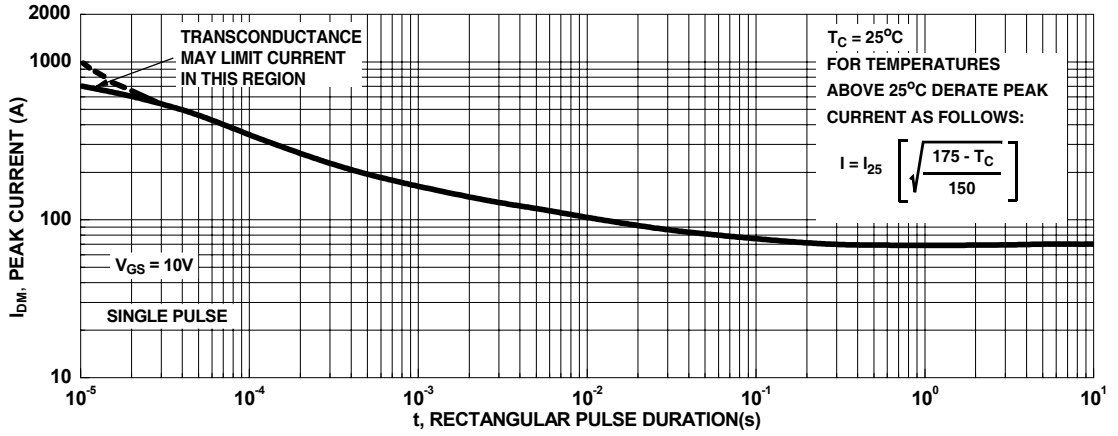


Figure 4. Peak Current Capability

Typical Characteristics

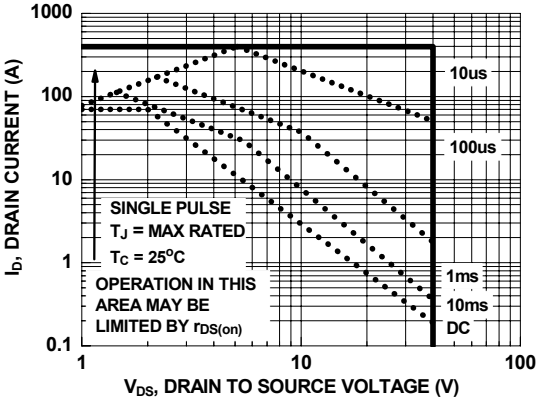
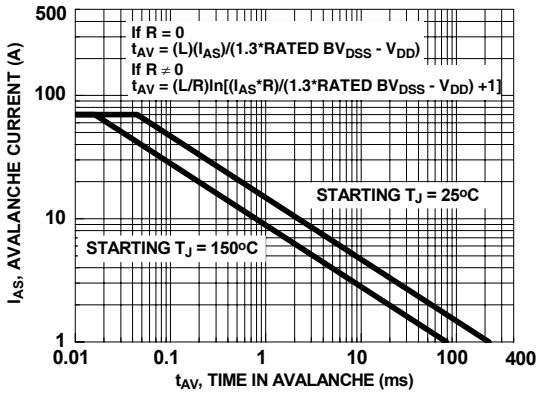


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to Fairchild Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching Capability

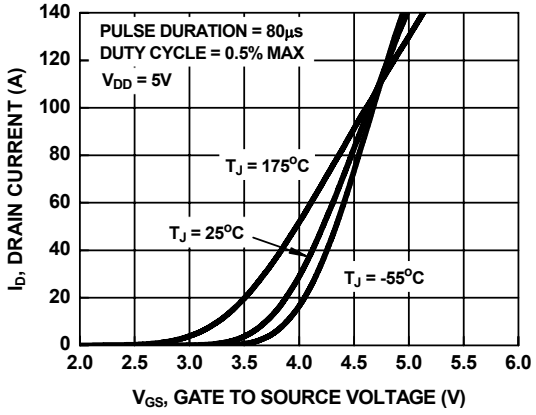


Figure 7. Transfer Characteristics

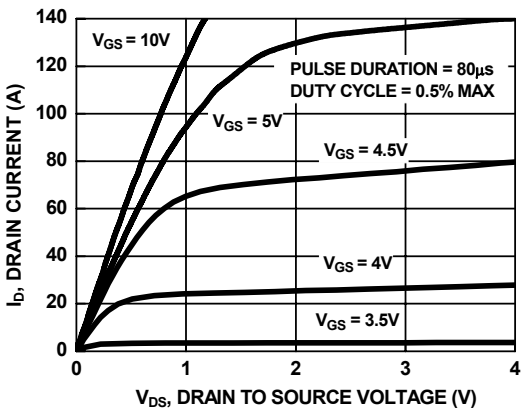


Figure 8. Saturation Characteristics

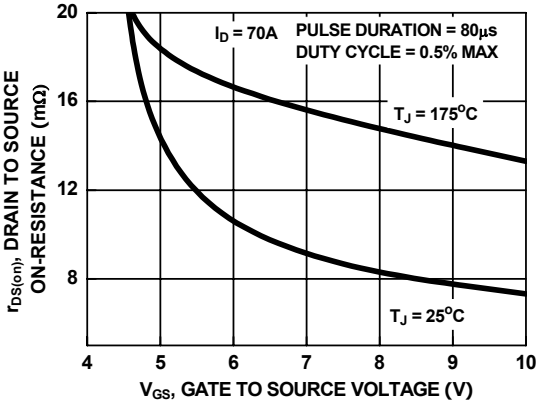


Figure 9. On-Resistance vs Gate to Source Voltage

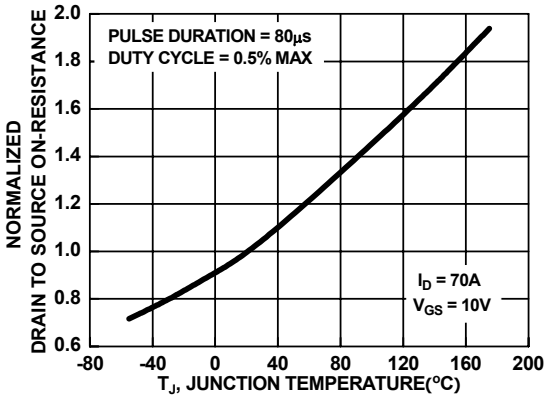


Figure 10. Normalized Drain to Source On Resistance vs Junction Temperature

Typical Characteristics

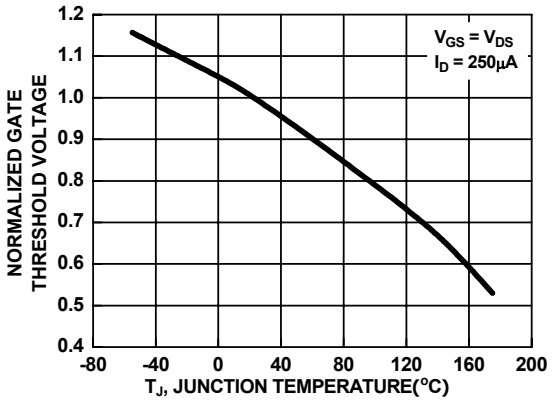


Figure 11. Normalized Gate Threshold Voltage vs Junction Temperature

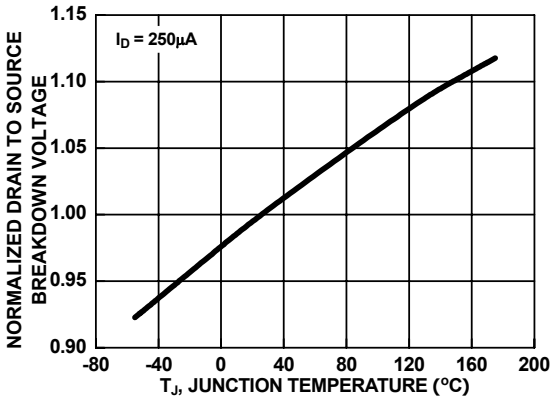


Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

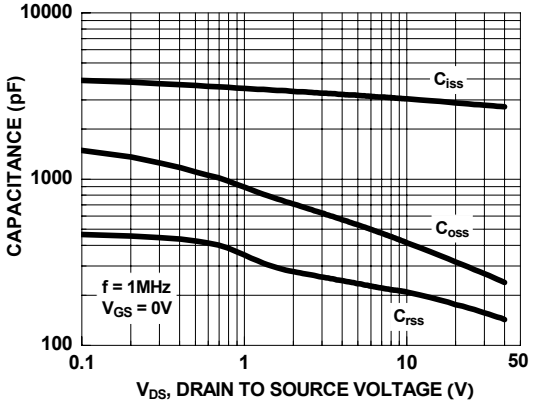


Figure 13. Capacitance vs Drain to Source Voltage

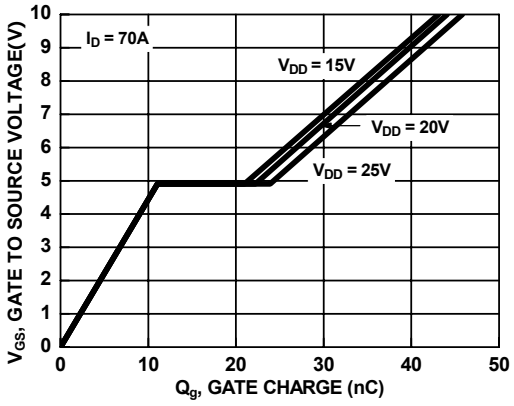


Figure 14. Gate Charge vs Gate to Source Voltage

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No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
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