FAIRCHILD SEMICONDUCTOR®

January 2006

FDB8860

N-Channel Logic Level PowerTrench® MOSFET
30V, 80A, 2.6mΩ

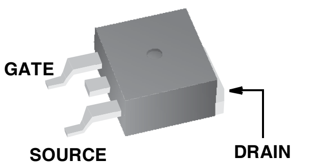
Features

- $R_{DS(ON)}$ = 1.9mΩ (Typ), V_{GS} = 5V, I_D = 80A
- $Q_{g(5)}$ = 89nC (Typ), V_{GS} = 5V
- Low Miller Charge
- Low Q_{RR} Body Diode
- UIS Capability (Single Pulse and Repetitive Pulse)
- Qualified to AEC Q101
- RoHS Compliant

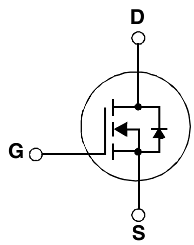
Applications

- 12V Automotive Load Control
- Start / Alternator Systems
- Electronic Power Steering Systems
- ABS
- DC-DC Converters

LEAD-FREE IMPLEMENTATION



TO-263AB
FDB SERIES



MOSFET Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DSS}	Drain to Source Voltage	30	V
V_{GS}	Gate to Source Voltage	±20	V
I_D	Drain Current Continuous (V_{GS} = 10V, T_C < 163°C)	80	A
	Continuous (V_{GS} = 5V, T_C < 162°C)	80	A
	Continuous (V_{GS} = 10V, T_C = 25°C, with $R_{\theta JA}$ = 43°C/W)	31	A
	Pulsed	Figure 4	A
E_{AS}	Single Pulse Avalanche Energy (Note 1)	947	mJ
P_D	Power Dissipation	306	W
	Derate above 25°C	2.04	W/°C
T_J, T_{STG}	Operating and Storage Temperature	-55 to +175	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance Junction to Case	0.49	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient (Note 2)	62	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient TO-263,1in² copper pad area	43	°C/W

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDB8860	FDB8860	TO-263AB	330mm	24mm	800units

Electrical Characteristics T_J = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 1mA, V_{GS} = 0V	30	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 24V V_{GS} = 0V	-	-	1	μA
		T_J = 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_{DS} = V_{GS}, I_D = 250μA	1	1.7	3	V
$R_{DS(ON)}$	Drain to Source On Resistance	I_D = 80A, V_{GS} = 10V	-	1.6	2.3	mΩ
		I_D = 80A, V_{GS} = 5V	-	1.9	2.6	
		I_D = 80A, V_{GS} = 4.5V	-	2.1	2.7	
		I_D = 80A, V_{GS} = 10V, T_J = 175°C	-	2.5	3.6	
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{DS} = 15V, V_{GS} = 0V, f = 1MHz	-	9460	12585	pF
C_{OSS}	Output Capacitance		-	1710	2275	pF
C_{RSS}	Reverse Transfer Capacitance		-	1050	1575	pF
R_G	Gate Resistance	f = 1MHz	-	1.8	-	Ω
$Q_{g(TOT)}$	Total Gate Charge at 10V	V_{GS} = 0V to 10V; V_{DD} = 15V, I_D = 80A, I_g = 1.0mA	-	165	214	nC
$Q_{g(5)}$	Total Gate Charge at 5V	V_{GS} = 0V to 5V	-	89	115	nC
$Q_{g(TH)}$	Threshold Gate Charge	V_{GS} = 0V to 1V	-	9.1	12	nC
Q_{gs}	Gate to Source Gate Charge		-	26	-	nC
Q_{gs2}	Gate Charge Threshold to Plateau		-	18	-	nC
Q_{gd}	Gate to Drain "Miller" Charge		-	33	-	nC

Electrical Characteristics T_J = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units

Switching Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$t_{(on)}$	Turn-On Time	V_{DD} = 15V, I_D = 80A V_{GS} = 5V, R_{GS} = 1Ω	-	-	340	ns
$t_{d(on)}$	Turn-On Delay Time		-	14	-	ns
t_r	Turn-On Rise Time		-	213	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	79	-	ns
t_f	Turn-Off Fall Time		-	49	-	ns
t_{off}	Turn-Off Time		-	-	192	ns

Drain-Source Diode Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
V_{SD}	Source to Drain Diode Voltage	I_{SD} = 80A	-	-	1.25	V
		I_{SD} = 40A	-	-	1.0	V
t_{rr}	Reverse Recovery Time	I_{SD} = 80A, dI_{SD}/dt = 100A/µs	-	-	43	ns
Q_{rr}	Reverse Recovery Charge	I_{SD} = 80A, dI_{SD}/dt = 100A/µs	-	-	29	nC

Notes:
1: Starting T_J = 25°C, L =0.47mH, I_{AS} = 64A , V_{DD} = 30V, V_{GS} = 10V.
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.

Typical Characteristics T_J = 25°C unless otherwise noted

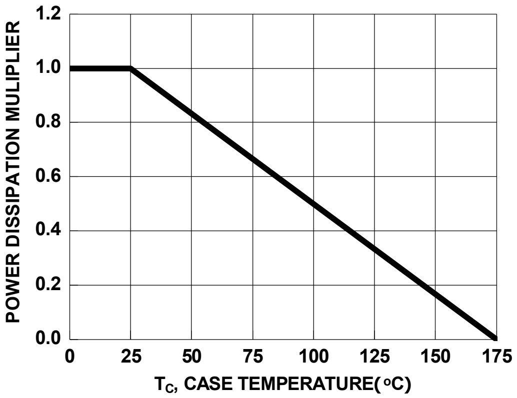


Figure 1. Normalized Power Dissipation vs Case Temperature

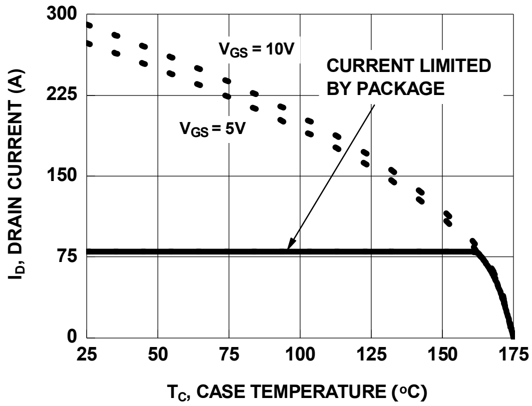


Figure 2. Maximum Continuous Drain Current vs Case Temperature

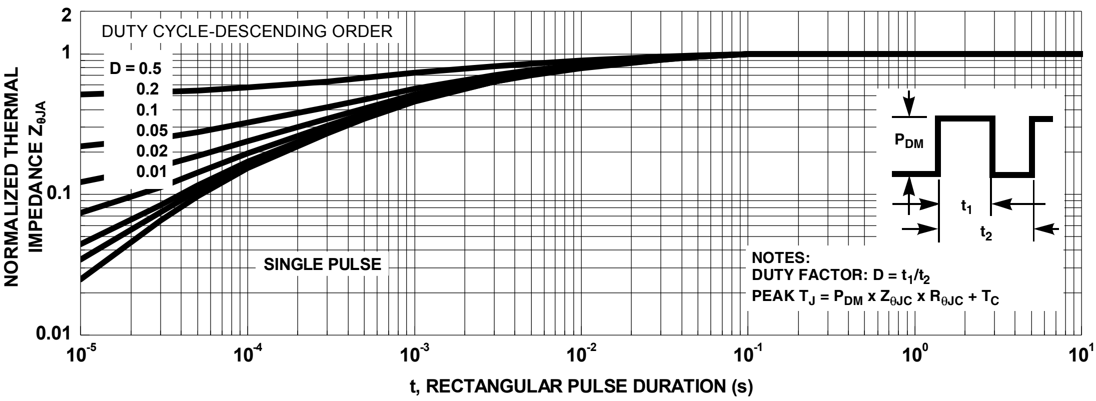


Figure 3. Normalized Maximum Transient Thermal Impedance

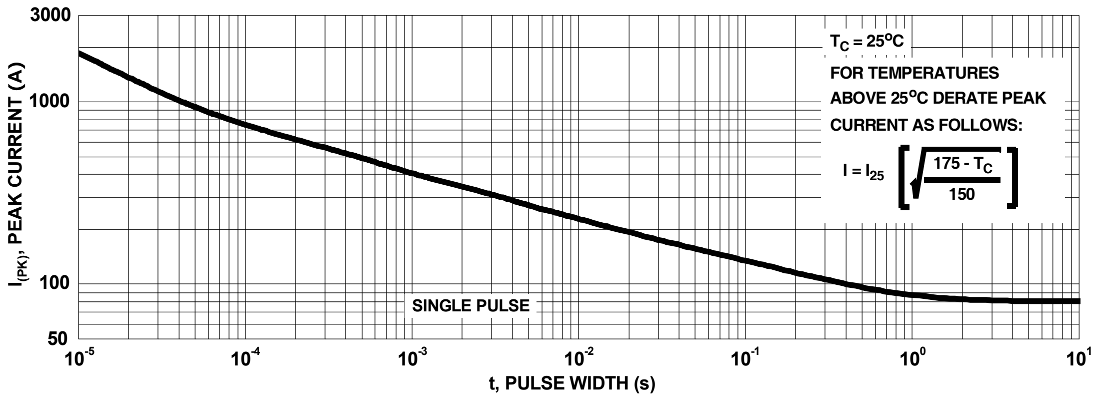


Figure 4. Peak Current Capability

Typical Characteristics T_J = 25°C unless otherwise noted

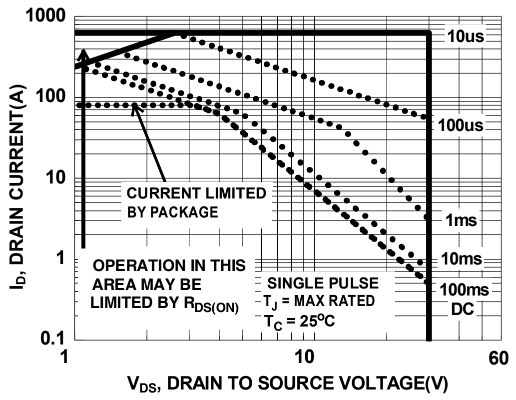
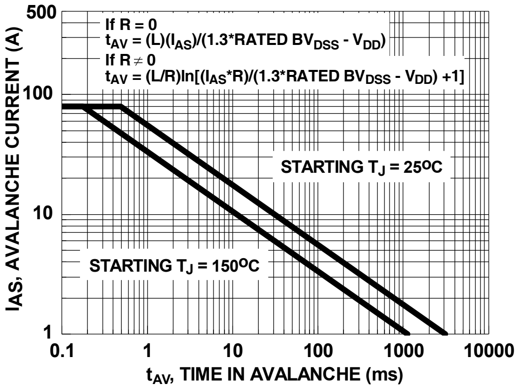


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to Fairchild Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching Capability

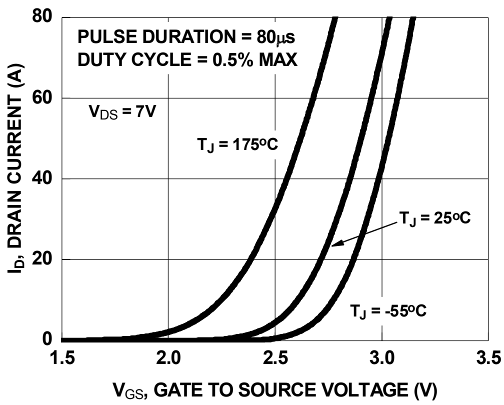


Figure 7. Transfer Characteristics

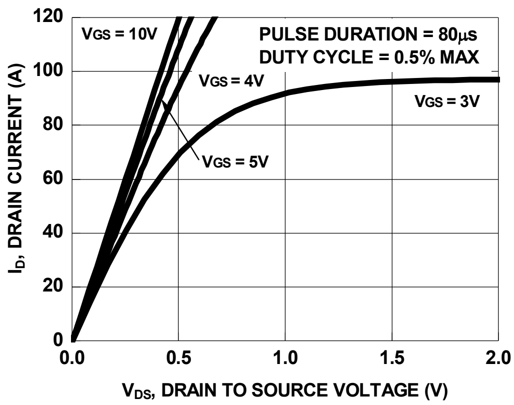


Figure 8. Saturation Characteristics

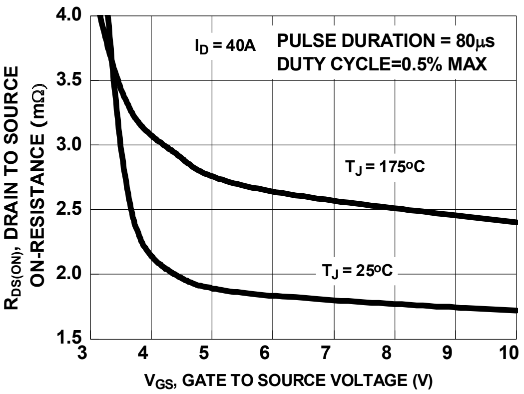


Figure 9. Drain to Source On-Resistance Variation vs Gate to Source Voltage

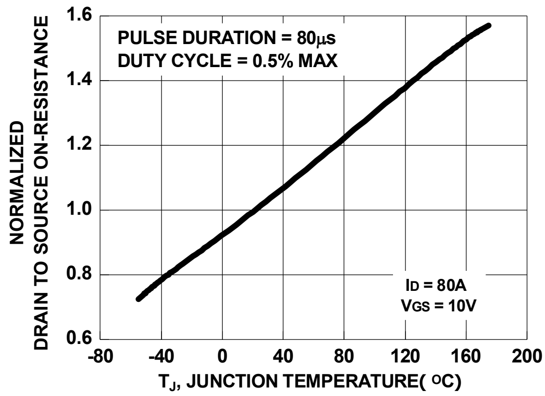


Figure 10. Normalized Drain to Source On Resistance vs Junction Temperature

Typical Characteristics T_J = 25°C unless otherwise noted

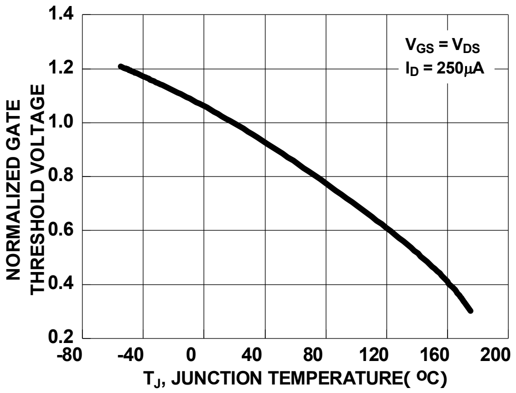


Figure 11. Normalized Gate Threshold Voltage vs Junction Temperature

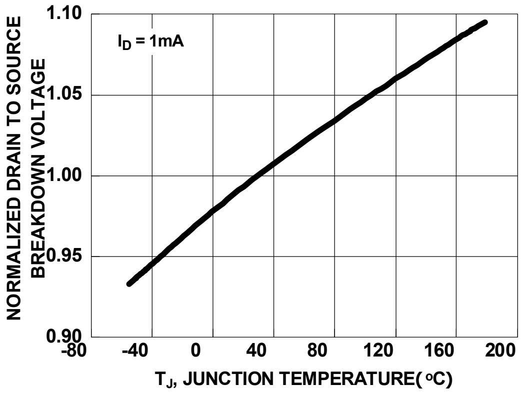


Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

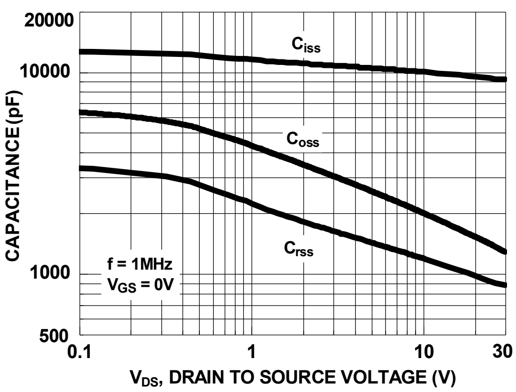


Figure 13. Capacitance vs Drain to Source Voltage

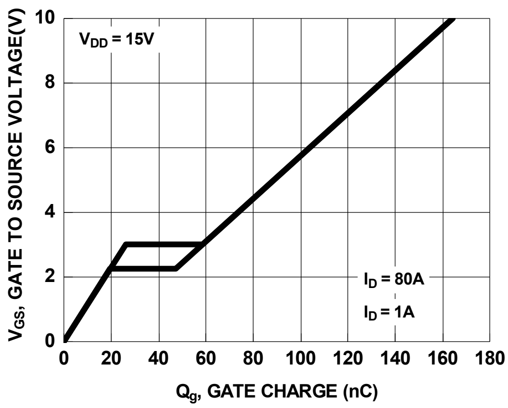


Figure 14. Gate Charge vs Gate to Source Voltage

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