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ON Semiconductor®

FDB8444-F085

N-Channel PowerTrench® MOSFET

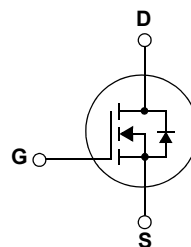
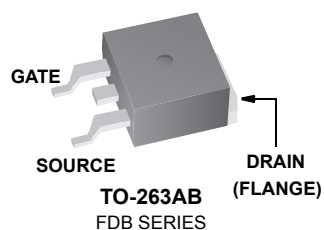
40V, 70A, 5.5mΩ

Features

- Typ $r_{DS(on)}$ = 3.9mΩ at V_{GS} = 10V, I_D = 70A
- Typ $Q_{g(TOT)}$ = 91nC 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 Transmission
- Distributed Power Architecture and VRMs
- Primary Switch for 12V Systems



Absolute 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	± 20	V
I_D	Drain Current Continuous ($V_{GS} = 10\text{V}$) (Note 1)	70	A
	Pulsed	Figure 4	
E_{AS}	Single Pulse Avalanche Energy (Note 2)	307	mJ
P_D	Power Dissipation	167	W
	Derate above 25°C	1.1	W/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature	-55 to +175	$^\circ\text{C}$

Thermal Characteristics

$R_{\theta JC}$	Maximum Thermal Resistance, Junction to Case	0.9	$^\circ\text{C/W}$
$R_{\theta JA}$	Maximum Thermal Resistance, Junction to Ambient TO-263, lin^2 cop-per pad area	43	$^\circ\text{C/W}$

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDB8444	FDB8444-F085	TO-263AB	330mm	24mm	800 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

$B_{V_{DS}}$	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	μA
		$V_{GS} = 0\text{V}$ $T_J = 150^\circ\text{C}$	-	-	250	μA
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{V}$	-	-	± 100	nA

On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	2	2.6	4	V
$r_{DS(on)}$	Drain to Source On Resistance	$I_D = 70\text{A}, V_{GS} = 10\text{V}$	-	3.9	5.5	$\text{m}\Omega$
		$I_D = 70\text{A}, V_{GS} = 10\text{V}, T_J = 175^\circ\text{C}$	-	7	9.9	

Dynamic Characteristics

C _{iss}	Input Capacitance	V _{DS} = 25V, V _{GS} = 0V, f = 1MHz		-	6040	8035	pF
C _{oss}	Output Capacitance			-	480	640	pF
C _{rss}	Reverse Transfer Capacitance			-	290	435	pF
R _G	Gate Resistance	f = 1MHz		-	2	-	Ω
Q _{g(TOT)}	Total Gate Charge at 10V	V _{GS} = 0 to 10V	V _{DD} = 20V, I _D = 70A,	-	91	128	nC
Q _{g(TH)}	Threshold Gate Charge	V _{GS} = 0 to 2V		-	7	10	nC
Q _{gs}	Gate to Source Gate Charge			-	23	-	nC
Q _{gs2}	Gate Charge Threshold to Plateau			-	17	-	nC
Q _{gd}	Gate to Drain “Miller” Charge			-	20	-	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

$t_{(on)}$	Turn-On Time	$V_{DD} = 20\text{V}, I_D = 70\text{A}$ $V_{GS} = 10\text{V}, R_{GS} = 2\Omega$	-	-	135	ns
$t_{d(on)}$	Turn-On Delay Time		-	12	-	ns
t_r	Turn-On Rise Time		-	78	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	48	-	ns
t_f	Turn-Off Fall Time		-	15	-	ns
t_{off}	Turn-Off Time		-	-	95	ns

Drain-Source Diode Characteristics

V_{SD}	Source to Drain Diode Voltage	$I_{SD} = 70\text{A}$	-	-	1.25	V
		$I_{SD} = 35\text{A}$	-	-	1.0	V
t_{rr}	Reverse Recovery Time	$I_F = 70\text{A}, di/dt = 100\text{A}/\mu\text{s}$	-	-	62	ns
Q_{rr}	Reverse Recovery Charge	$I_F = 70\text{A}, di/dt = 100\text{A}/\mu\text{s}$	-	-	82	nC

Notes:

- 1: Maximum wire current carrying capacity is 70A.
 2: Starting $T_J = 25^\circ\text{C}$, $L = 0.2\text{mH}$, $I_{AS} = 56\text{A}$.

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 ON Semiconductor products are manufactured, assembled and tested under ISO9000 and QS9000 quality systems certification.

Typical Characteristics

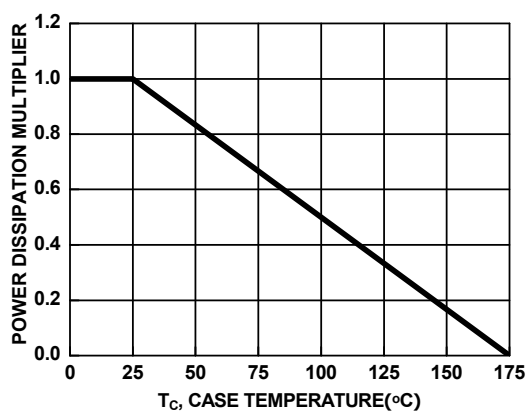


Figure 1. Normalized Power Dissipation vs Case Temperature

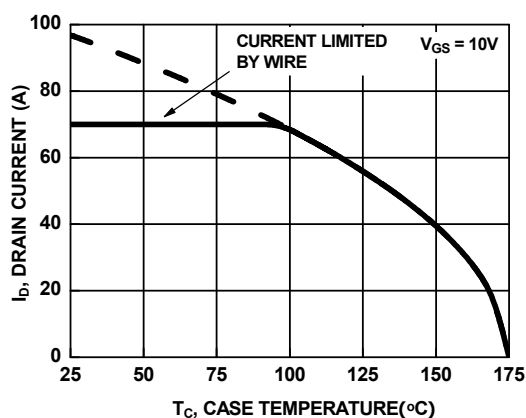


Figure 2. Maximum Continuous Drain Current vs Case Temperature

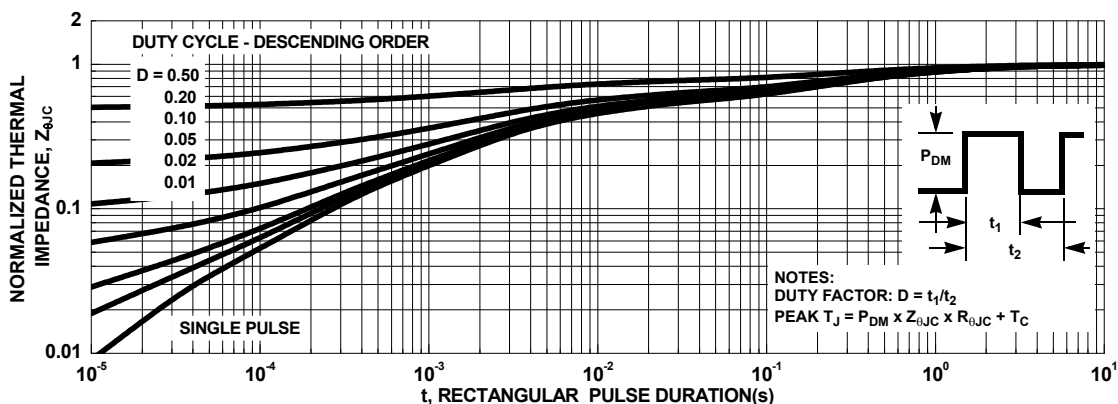


Figure 3. Normalized Maximum Transient Thermal Impedance

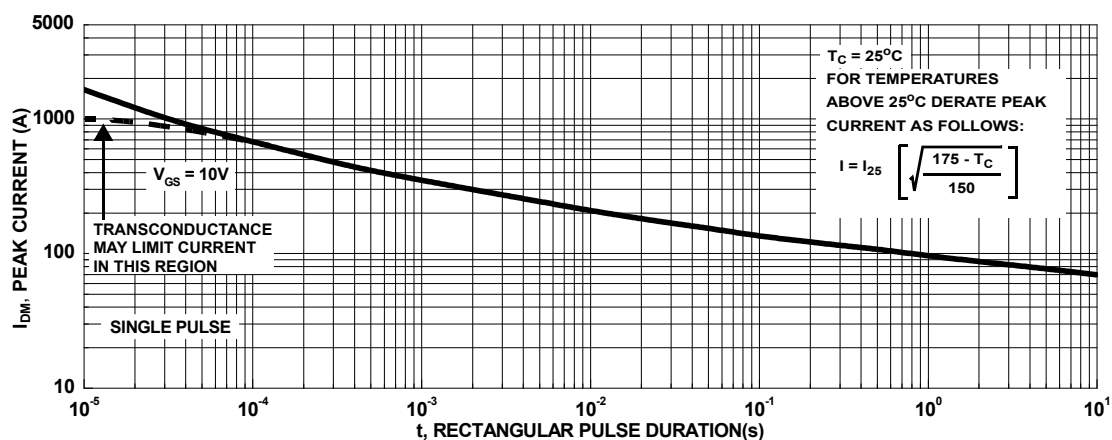


Figure 4. Peak Current Capability

Typical Characteristics

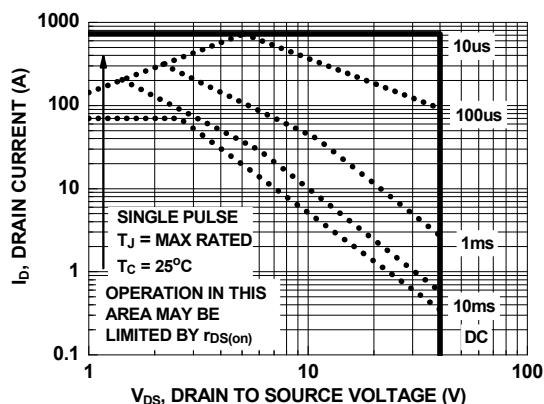
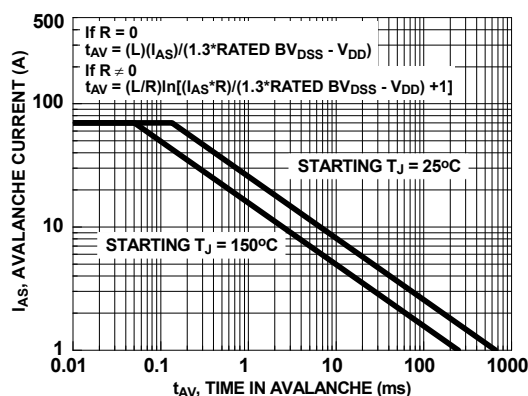


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to ON Semiconductor Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching Capability

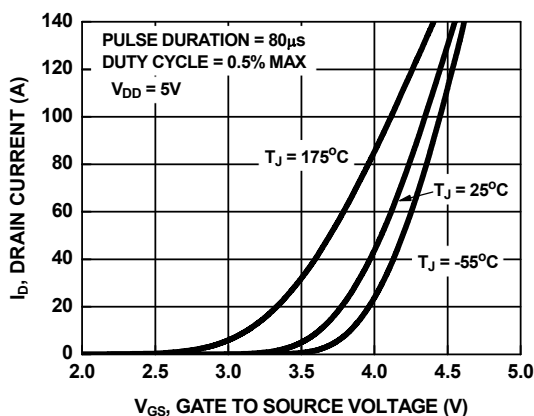


Figure 7. Transfer Characteristics

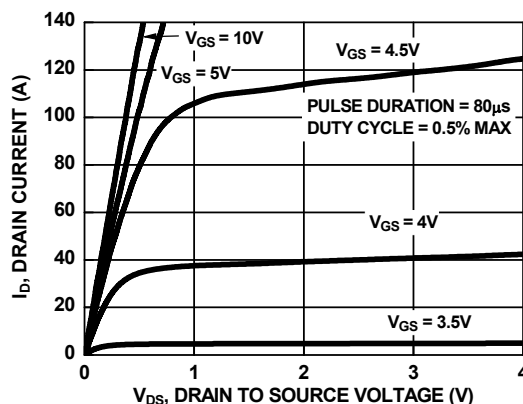


Figure 8. Saturation Characteristics

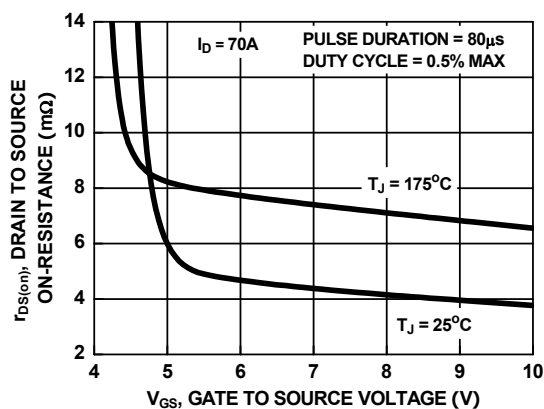


Figure 9. Drain to Source On-Resistance Variation vs Gate to Source Voltage

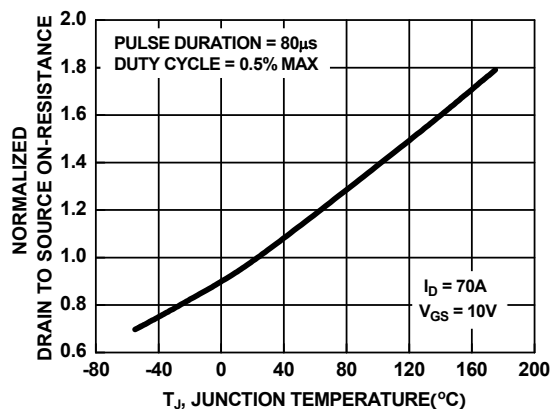


Figure 10. Normalized Drain to Source On-Resistance vs Junction Temperature

Typical Characteristics

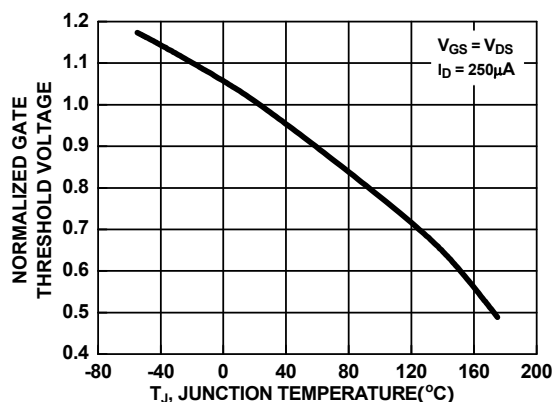


Figure 11. Normalized Gate Threshold Voltage vs Junction Temperature

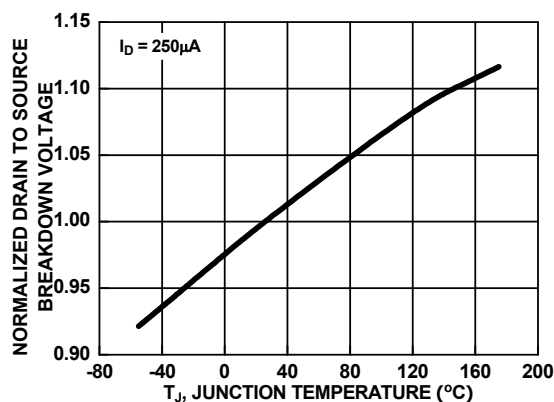


Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

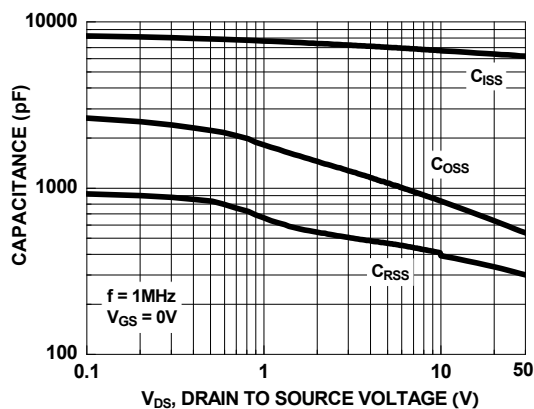


Figure 13. Capacitance vs Drain to Source Voltage

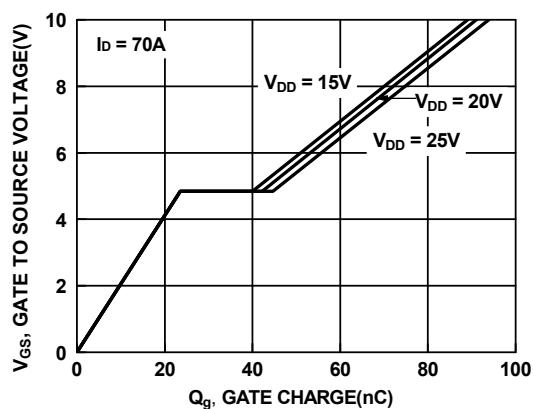


Figure 14. Gate Charge vs Gate to Source Voltage

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