ON Semiconductor®

FDP8442-F085

N-Channel PowerTrench® MOSFET
40V, 80A, 3.1mΩ

Features

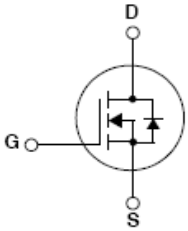
- Typ $r_{DS(on)}$ = 2.3mΩ at V_{GS} = 10V, I_D = 80A
- Typ $Q_{g(10)}$ = 181nC at V_{GS} = 10V
- Low Miller Charge
- Low Q_{rr} Body Diode
- UIS Capability (Single Pulse and Repetitive Pulse)
- Qualified to AEC Q101
- RoHS Compliant

Applications

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



TO-220AB
FDP SERIES



©2010 Semiconductor Components Industries, LLC.
September-2017, Rev. 2

Publication Order Number:
FDP8442-F085/D

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<158°C, V_{GS} = 10V)	80	A
	Drain Current Continuous (T_{amb} = 25°C, V_{GS} = 10V, with $R_{\theta JA}$ = 62°C/W)	23	
	Pulsed	See Figure 4	
E_{AS}	Single Pulse Avalanche Energy (Note 1)	720	mJ
P_D	Power Dissipation	254	W
	Derate above 25°C	1.7	W/°C
T_J, T_{STG}	Operating and Storage Temperature	-55 to +175	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance Junction to Case	0.59	°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
FDP8442	FDP8442-F085	TO-220AB	Tube	N/A	50 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
		V_{DS} = 32V, V_{GS} = 0V, 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	2	2.9	4	V
$r_{DS(on)}$	Drain to Source On Resistance	I_D = 80A, V_{GS} = 10V	-	2.3	3.1	mΩ
		I_D = 80A, V_{GS} = 10V, T_J = 175°C	-	3.9	5.3	
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1MHz	-	12200	-	pF
C_{oss}	Output Capacitance		-	1040	-	pF
C_{rss}	Reverse Transfer Capacitance		-	640	-	pF
R_G	Gate Resistance	V_{GS} = 0.5V, f = 1MHz	-	1.0	-	Ω
$Q_{g(TOT)}$	Total Gate Charge at 10V	V_{GS} = 0 to 10V, V_{DD} = 20V, I_D = 80A, I_g = 1mA	-	181	235	nC
$Q_{g(TH)}$	Threshold Gate Charge	V_{GS} = 0 to 2V, V_{DD} = 20V, I_D = 80A, I_g = 1mA	-	23	30	nC
Q_{gs}	Gate to Source Gate Charge	V_{DD} = 20V, I_D = 80A, I_g = 1mA	-	49	-	nC
Q_{gs2}	Gate Charge Threshold to Plateau	V_{DD} = 20V, I_D = 80A, I_g = 1mA	-	26	-	nC
Q_{gd}	Gate to Drain “Miller” Charge	V_{DD} = 20V, I_D = 80A, I_g = 1mA	-	41	-	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 = 80A V_{GS} = 10V, R_{GS} = 2Ω	-	-	62	ns
$t_{d(on)}$	Turn-On Delay Time		-	19.5	-	ns
t_r	Turn-On Rise Time		-	19.3	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	57	-	ns
t_f	Turn-Off Fall Time		-	17.2	-	ns
t_{off}	Turn-Off Time		-	-	118	ns
Drain-Source Diode Characteristics						
V_{SD}	Source to Drain Diode Voltage	I_{SD} = 80A	-	0.9	1.25	V
		I_{SD} = 40A	-	0.8	1.0	V
t_{rr}	Reverse Recovery Time	I_F = 75A, di/dt = 100A/μs	-	49	64	ns
Q_{rr}	Reverse Recovery Charge	I_F = 75A, di/dt = 100A/μs	-	70	91	nC

Notes:
1: Starting T_J = 25°C, L = 0.35mH, I_{AS} = 64A
2: Pulse width = 100s.

Typical Characteristics

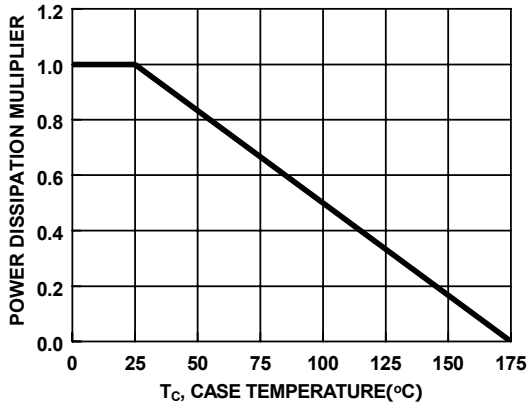


Figure 1. Normalized Power Dissipation vs Case Temperature

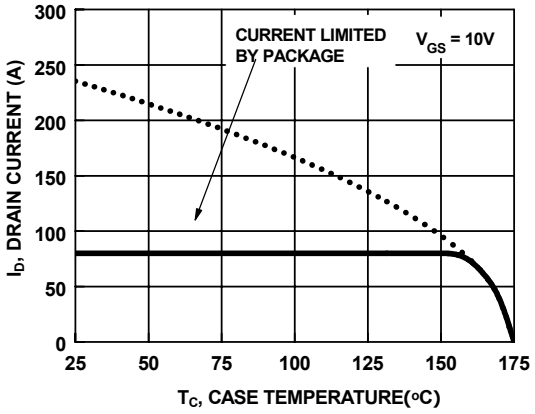


Figure 2. Maximum Continuous Drain Current vs Case Temperature

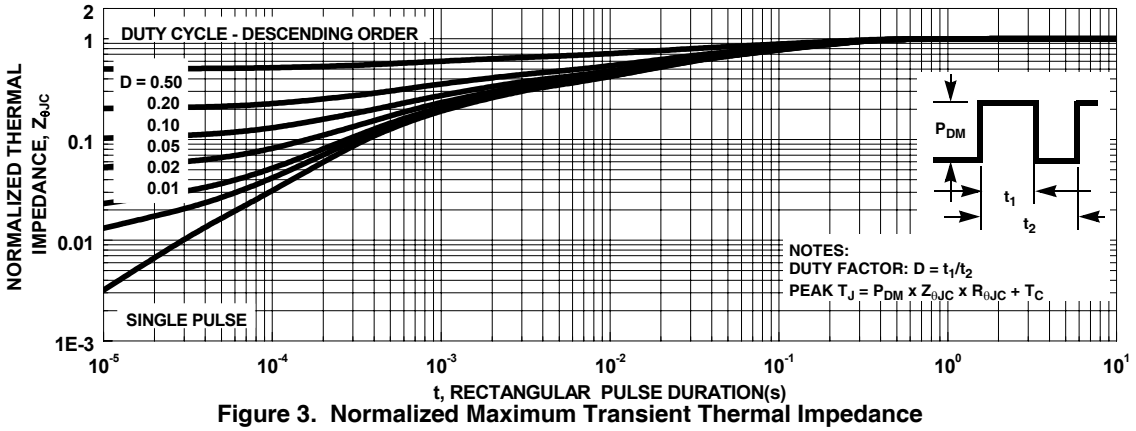


Figure 3. Normalized Maximum Transient Thermal Impedance

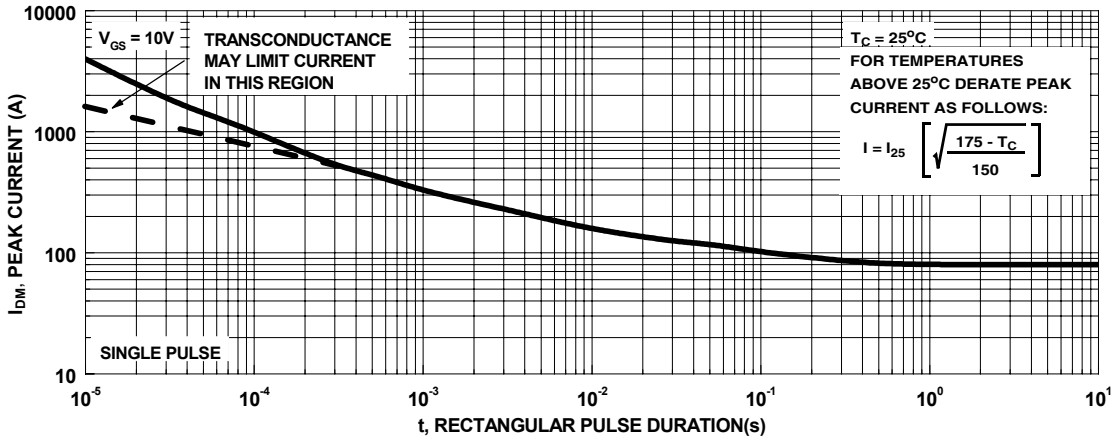


Figure 4. Peak Current Capability

Typical Characteristics

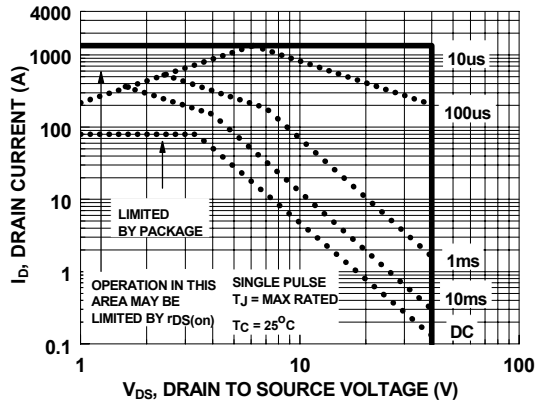


Figure 5. Forward Bias Safe Operating Area

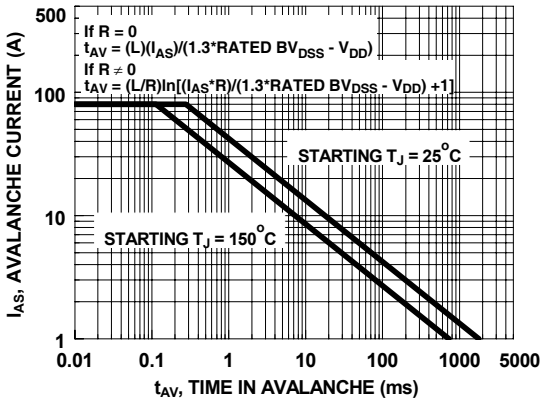


Figure 6. Unclamped Inductive Switching Capability

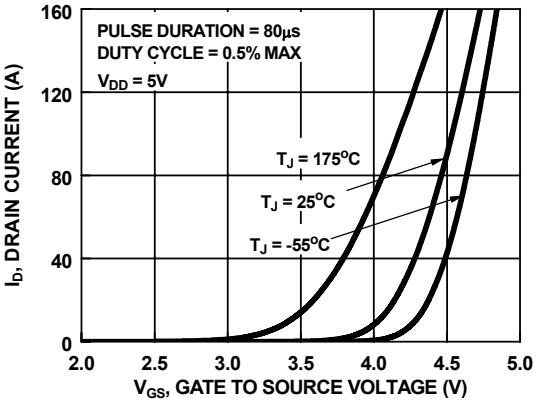


Figure 7. Transfer Characteristics

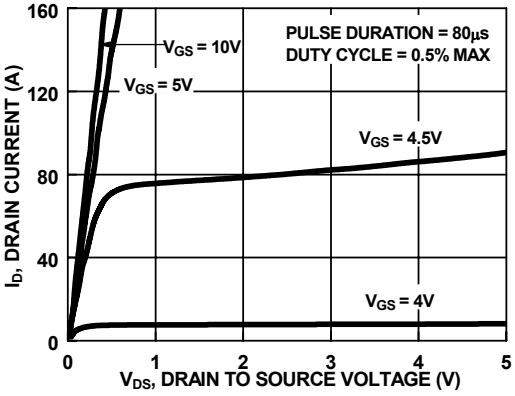


Figure 8. Saturation Characteristics

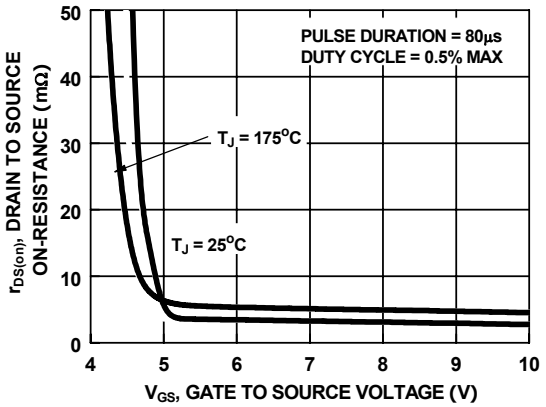


Figure 9. Drain to Source On-Resistance Variation vs Gate to Source Voltage

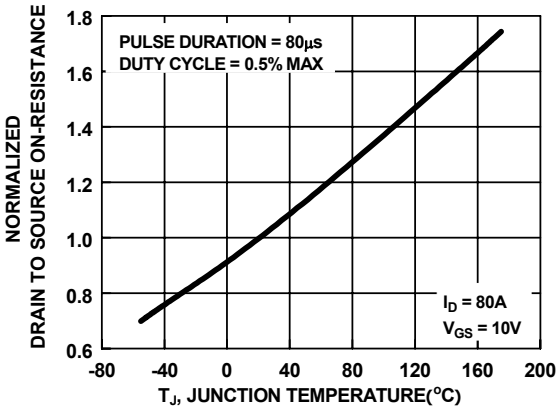


Figure 10. Normalized Drain to Source On Resistance vs Junction Temperature

Typical Characteristics

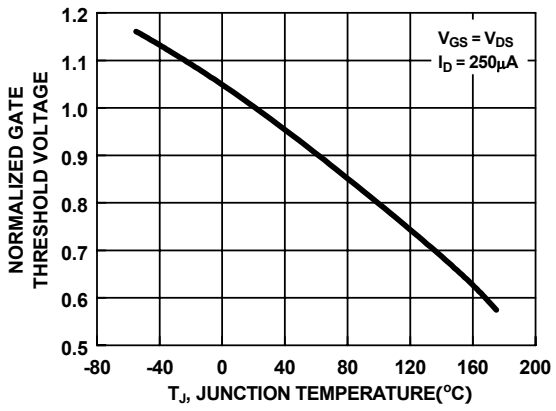


Figure 11. Normalized Gate Threshold Voltage vs Junction Temperature

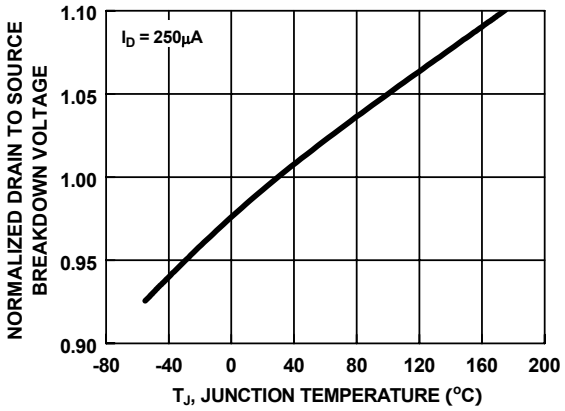


Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

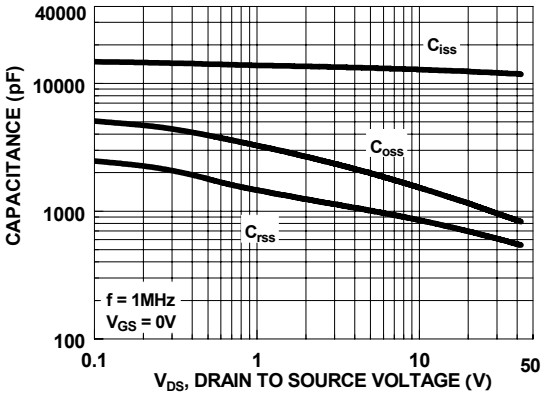


Figure 13. Capacitance vs Drain to Source Voltage

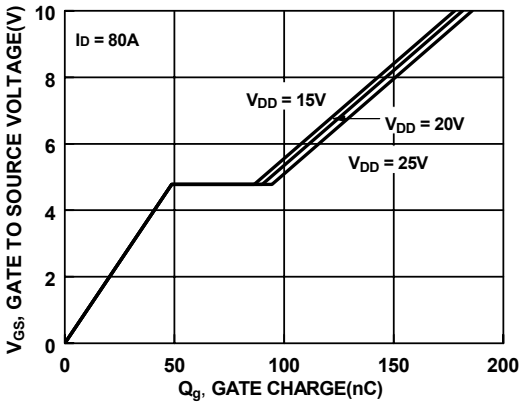


Figure 14. Gate Charge vs Gate to Source Voltage

ON Semiconductor and ON are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent−Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81−3−5817−1050

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative