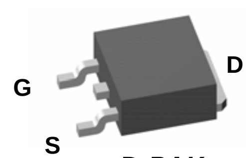
ON Semiconductor®

FDD8445-F085

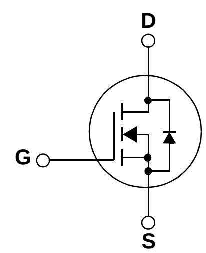
N-Channel PowerTrench® MOSFET
40V, 50A, 6.7mΩ

Features

- Typ $R_{DS(on)}$ = 6.7mΩ at V_{GS} = 10V, I_D = 50A
- Typ $Q_{g(10)}$ = 45nC at V_{GS} = 10V, I_D = 50A
- Low Miller Charge
- Low Qrr Body Diode
- UIS Capability (Single Pulse/ Repetitive Pulse)
- RoHS Compliant
- Qualified to AEC Q101



D-PAK
(TO-252)



Applications

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

MOSFET Maximum Ratings T_A = 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)	50	A
	Pulsed	Figure 4	
E_{AS}	Single Pulse Avalanche Energy (Note 1)	144	mJ
P_D	Power Dissipation	79	W
	Derate above 25°C	0.53	W/°C
T_J, T_{STG}	Operating and Storage Temperature	-55 to +175	°C
$R_{\theta JC}$	Thermal Resistance Junction to Case	1.9	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient, 1in² copper pad area	52	°C/W

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDD8445	FDD8445-F085	TO-252AA	13"	12mm	2500 units

Notes:
1: Starting T_J = 25°C, L = 0.18mH, I_{AS} = 40A
2: A suffix as "…F085P" has been temporarily introduced in order to manage a double source strategy as ON Semiconductor has officially announced in Aug 2014.

Electrical Characteristics T_A = 25°C unless otherwise noted

Off Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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_A = 150°C	-	-	250	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±20V	-	-	±100	nA

On Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$V_{GS(th)}$	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 = 50A, V_{GS}= 10V	-	6.7	8.7	mΩ
		I_D = 50A, V_{GS}= 10V, T_J = 175°C	-	12.5	16.3	mΩ

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1MHz	-	3040	4050	pF
C_{oss}	Output Capacitance		-	295	390	pF
C_{rss}	Reverse Transfer Capacitance		-	178	270	pF
R_G	Gate Resistance	f = 1MHz	-	1.7	-	Ω
$Q_{g(TOT)}$	Total Gate Charge at 10V	V_{GS} = 0 to 10V; V_{DD} = 20V, I_D = 50A	-	45	59	nC
$Q_{g(TH)}$	Threshold Gate Charge	V_{GS} = 0 to 2V; V_{DD} = 20V, I_D = 50A		5.8	7.6	nC
Q_{gs}	Gate to Source Gate Charge	V_{DD} = 20V, I_D = 50A	-	12.5	-	nC
Q_{gd}	Gate to Drain “Miller“ Charge		-	10.5	-	nC

Switching Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
t_{on}	Turn-On Time	V_{DD} = 20V, I_D = 50A, V_{GS} = 10V, R_{GS} = 2Ω	-	-	138	ns
$t_{d(on)}$	Turn-On Delay Time		-	10	-	ns
t_r	Rise Time		-	82	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	26	-	ns
t_f	Fall Time		-	9.6	-	ns
t_{off}	Turn-Off Time		-	-	53	ns

Drain-Source Diode Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
V_{SD}	Source to Drain Diode Voltage	I_{SD} = 50A	-	-	1.25	V
		I_{SD} = 25A	-	-	1.0	V
t_{rr}	Reverse Recovery Time	I_{SD} = 50A, dI_{SD}/dt = 100A/μs	-	-	39	ns
Q_{rr}	Reverse Recovery Charge		-	-	38	nC

Typical Characteristics

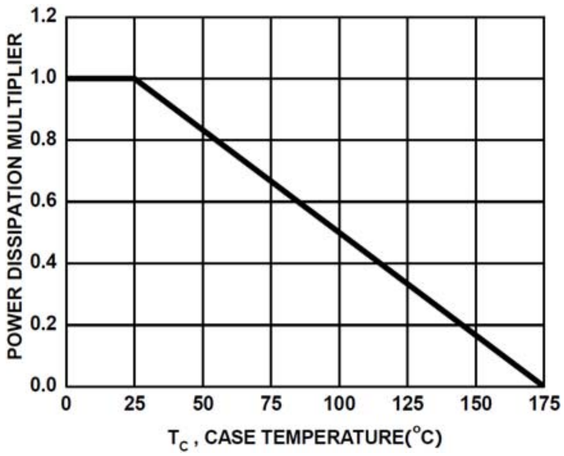


Figure 1. Normalized Power Dissipation vs Case Temperature

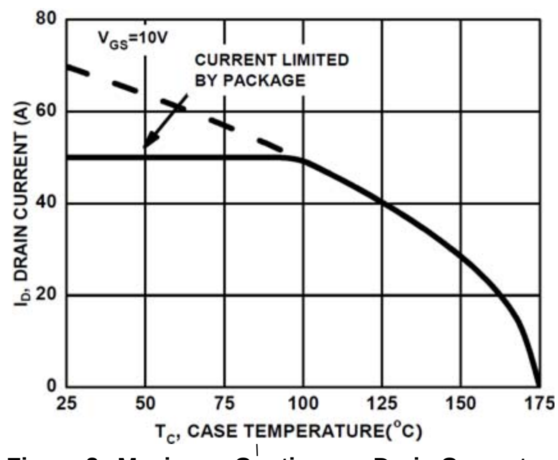


Figure 2. Maximum Continuous Drain Current vs Case Temperature

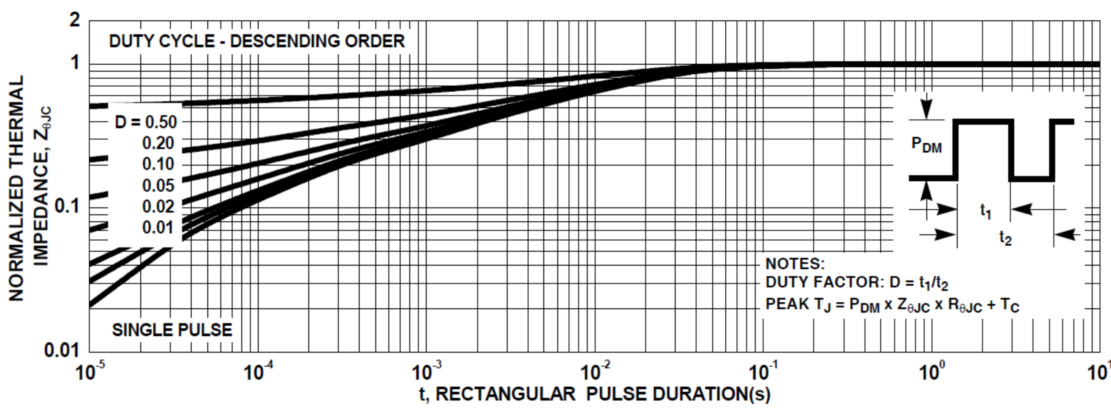


Figure 3. Normalized Maximum Transient Thermal Impedance

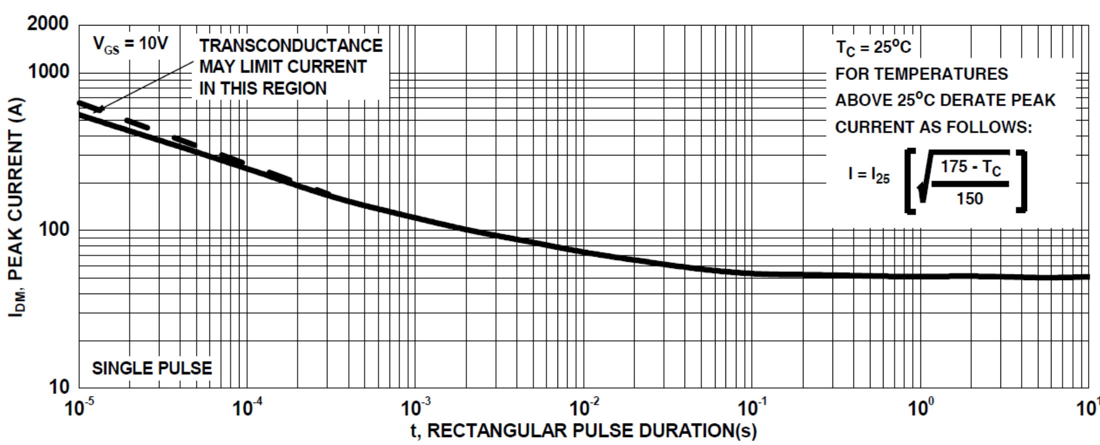


Figure 4. Peak Current Capability

Typical Characteristics

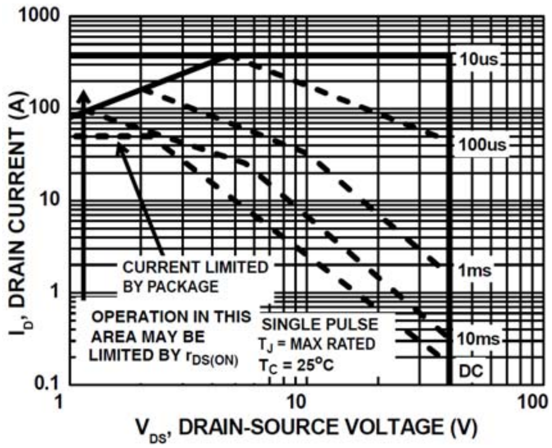


Figure 5. Forward Bias Safe Operating Area

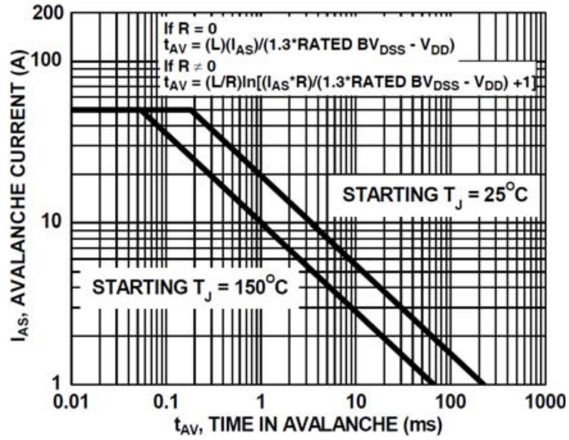


Figure 6. Unclamped Inductive Switching Capability

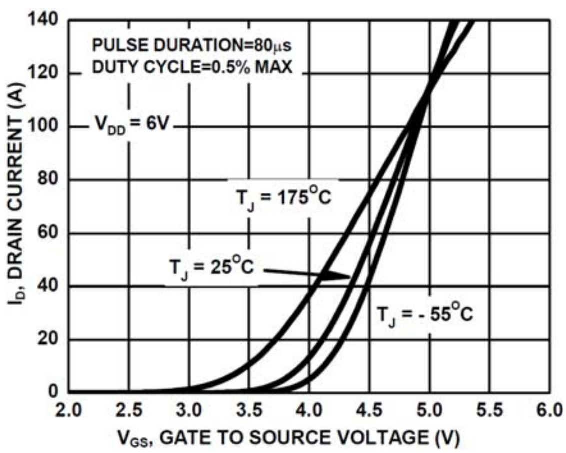


Figure 7. Transfer Characteristics

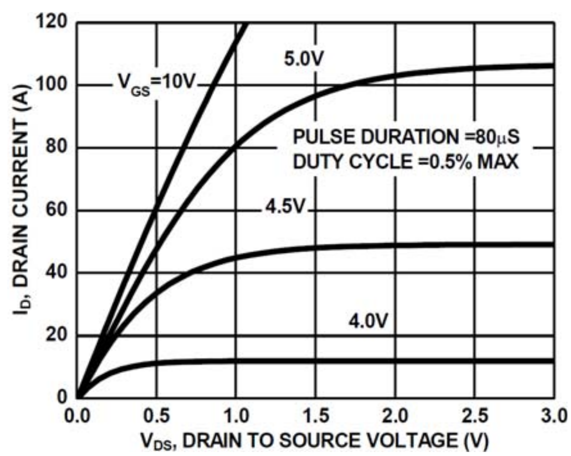


Figure 8. Saturation Characteristics

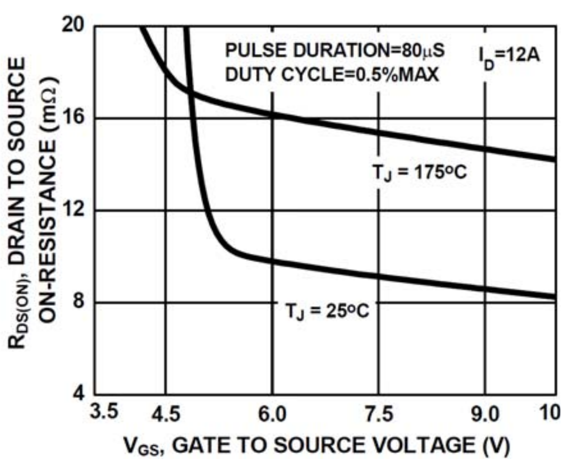


Figure 9. Drain to Source On-Resistance Variation vs Gate to Source Voltage

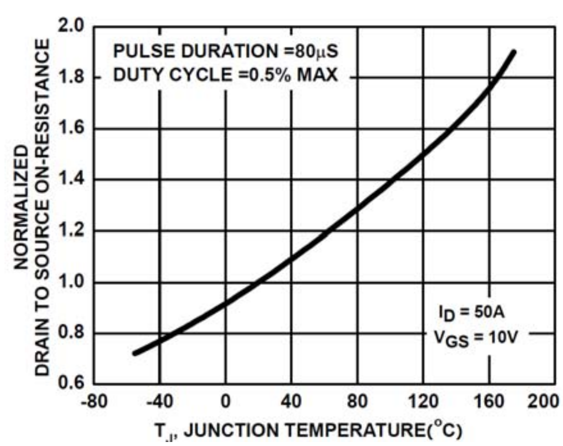


Figure 10. Normalized Drain to Source On Resistance vs Junction Temperature

Typical Characteristics

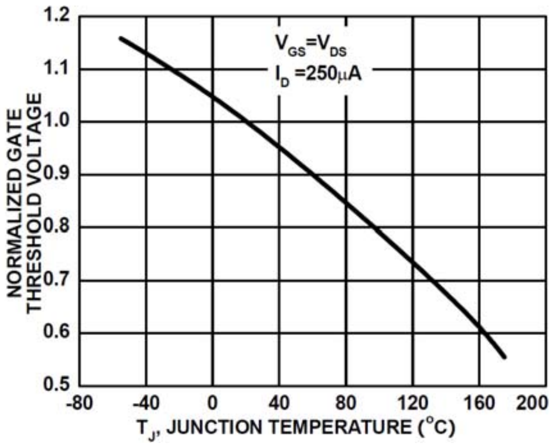


Figure 11. Normalized Gate Threshold Voltage vs Junction Temperature

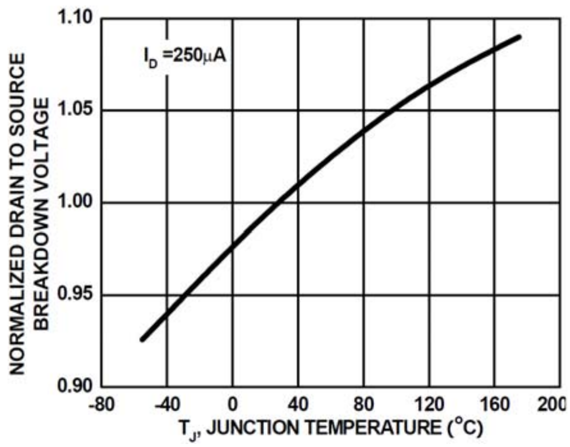


Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

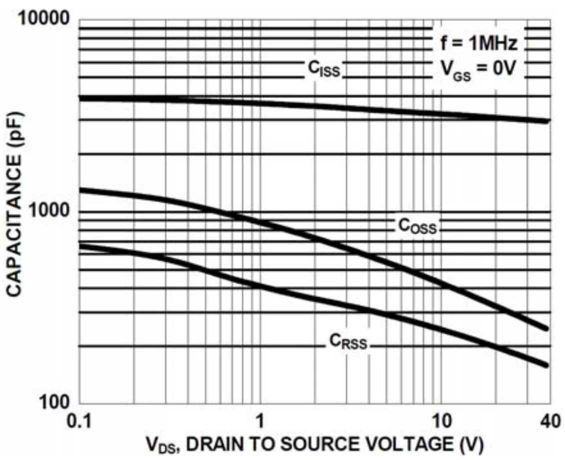


Figure 13. Capacitance vs Drain to Source Voltage

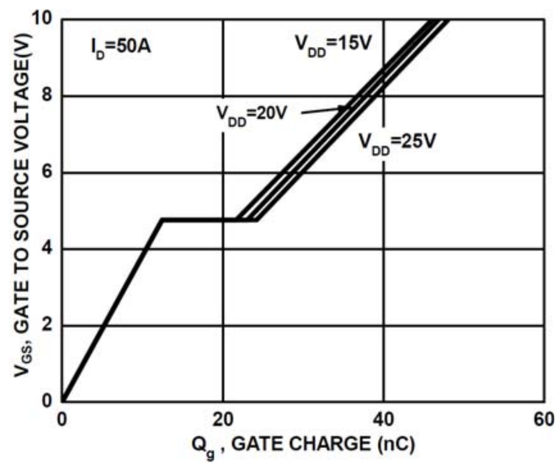


Figure 14. Gate Charge vs Gate to Source Voltage

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