ON Semiconductor

Is Now

To learn more about onsemi™, please visit our website at www.onsemi.com

ON Semiconductor®

FDD4685-F085

P-Channel PowerTrench® MOSFET

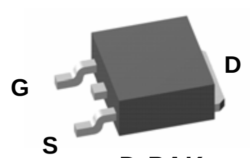
-40 V, -32 A, 35 mΩ

Features

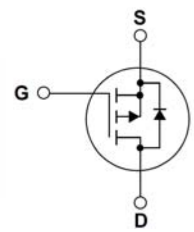
- Typical $R_{DS(on)}$ = 23 mΩ at V_{GS} = -10V, I_D = -8.4 A
- Typical $R_{DS(on)}$ = 30 mΩ at V_{GS} = -4.5V, I_D = -7 A
- Typical $Q_{g(tot)}$ = 19 nC at V_{GS} = -5V, I_D = -8.4 A
- UIS Capability
- RoHS Compliant
- Qualified to AEC Q101

Applications

- Inverter
- Power Supplies



D-PAK
(TO-252)



MOSFET Maximum Ratings T_J = 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 < 90°C, V_{GS}=10) (Note 1)	-32	A
	Pulsed Drain Current	See Figure 4	
E_{AS}	Single Pulse Avalanche Energy (Note 2)	121	mJ
P_D	Power Dissipation	83	W
	Derate Above 25°C	0.56	W/°C
T_J, T_{STG}	Operating and Storage Temperature	-55 to + 175	°C
$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.8	°C/W
$R_{\theta JA}$	Maximum Thermal Resistance, Junction to Ambient (Note 3)	40	°C/W

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDD4685	FDD4685-F085	D-PAK(TO-252)	13”	12mm	2500units

Notes:
1. Current is limited by bondwire configuration.
2. Starting T_J = 25°C, L = 3mH, I_{AS} = 9A, V_{DD} = 40V during inductor charging and V_{DD} = 0V during time in avalanche.
3. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance, where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design, while $R_{\theta JA}$ is determined by the board design. The maximum rating presented here is based on mounting on a 1 in^2 pad of 2oz copper.
4. 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_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
$\frac{\Delta B_{VDSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	ID = -250μA, referenced to 25°C	-	-33	-	mV/°C
I_{DSS}	Drain-to-Source Leakage Current	V_{DS} = -32V	-	-	-1	μA
I_{GSS}	Gate-to-Source Leakage Current	V_{GS} = ±20V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = -250μA	-1	-1.6	-3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	ID = –250μA, referenced to 25°C	-	4.9	-	mV/°C
$R_{DS(on)}$	Drain to Source On Resistance	I_D = -8.4A, V_{GS}= -10V	-	23	27	mΩ
		I_D = -7A, V_{GS}= -4.5V	-	30	35	
		I_D = -8.4A, V_{GS}= -10V, T_J = 150°C	-	38	45	
g_{FS}	Forward Transconductance	ID = –8.4A, VDS = –5V	-	23	-	s
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = -20V, V_{GS} = 0V, f = 1MHz	-	1790	2380	pF
C_{oss}	Output Capacitance		-	260	345	pF
C_{rss}	Reverse Transfer Capacitance		-	140	205	pF
R_g	Gate Resistance	f = 1MHz	-	4	-	Ω
$Q_{g(ToT)}$	Total Gate Charge	V_{DD} = -20V, V_{GS} = -5V, I_D = -8.4A	-	19	27	nC
Q_{gs}	Gate-to-Source Gate Charge		-	5.6	-	nC
Q_{gd}	Gate-to-Drain “Miller“ Charge		-	6.1	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay	V_{DD} = -20V, I_D = -8.4A, V_{GS} = -10V, R_{GEN} = 6Ω	-	8	16	ns
t_r	Rise Time		-	15	27	ns
$t_{d(off)}$	Turn-Off Delay		-	34	55	ns
t_f	Fall Time		-	14	26	ns
Drain-Source Diode Characteristics						
V_{SD}	Source-to-Drain Diode Voltage	I_{SD} = -8.4A, V_{GS} = 0V	-	-0.85	-1.2	V
t_{rr}	Reverse-Recovery Time	I_{SD} = -8.4A, dI_{SD}/dt = 100A/μs	-	30	45	ns
Q_{rr}	Reverse-Recovery Charge		-	31	47	nC

Typical Characteristics

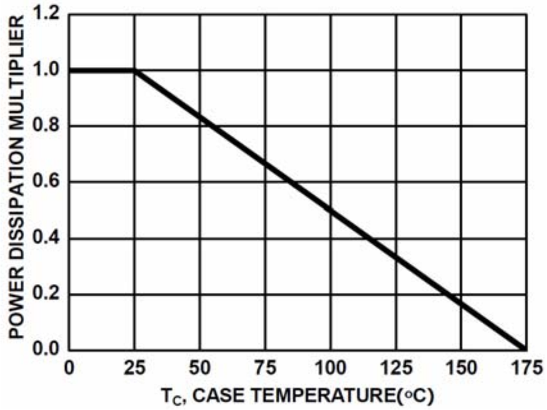


Figure 1. Normalized Power Dissipation vs. Case Temperature

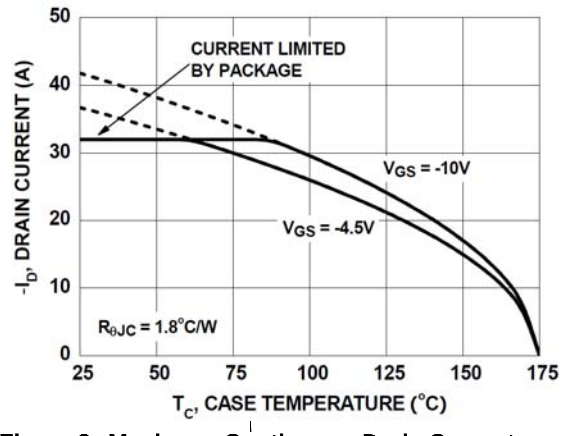


Figure 2. Maximum Continuous Drain Current vs. Case Temperature

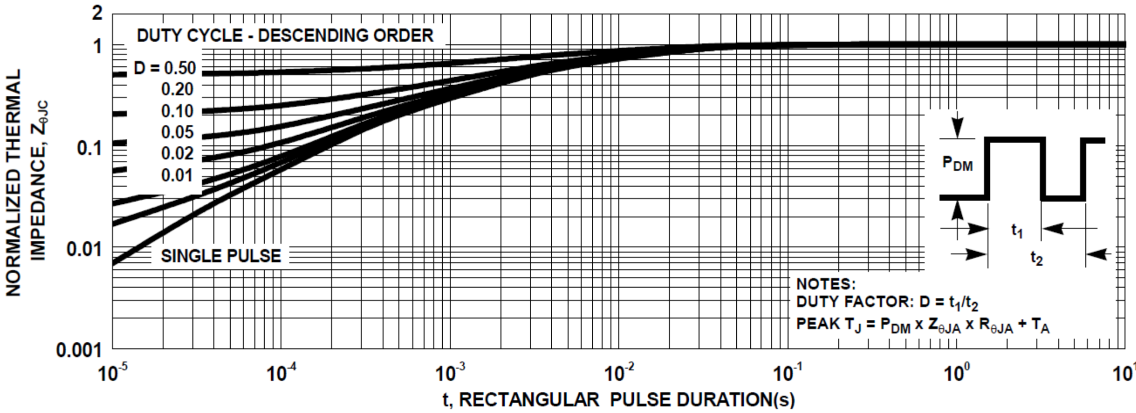


Figure 3. Normalized Maximum Transient Thermal Impedance

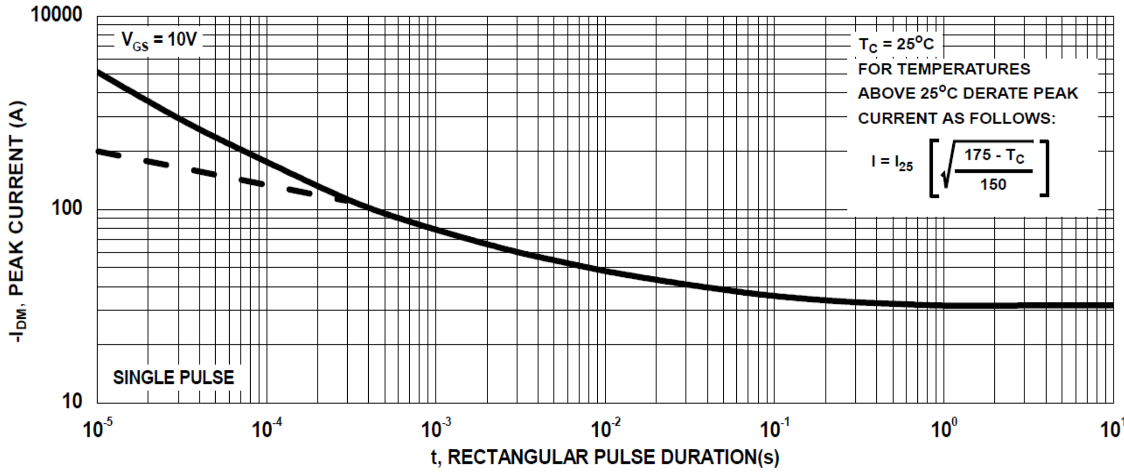


Figure 4. Peak Current Capability

Typical Characteristics

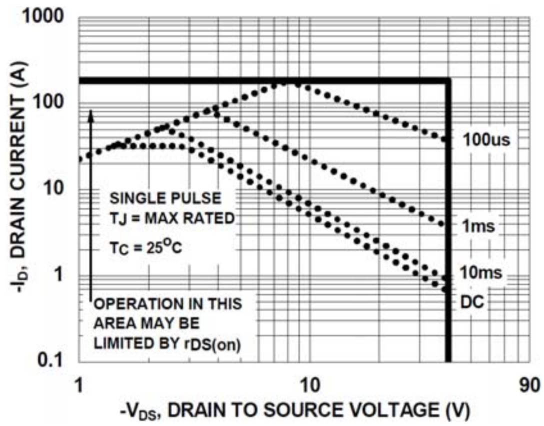
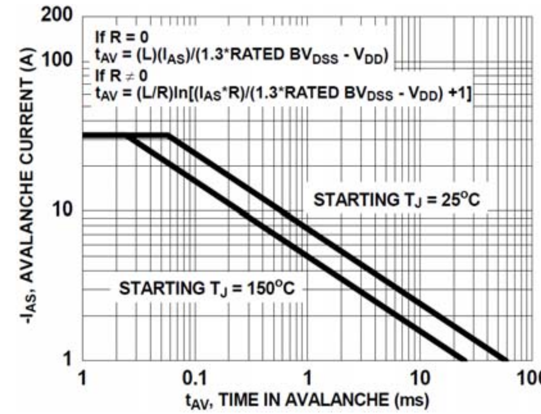


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to ON SemiconductorApplication Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching Capability

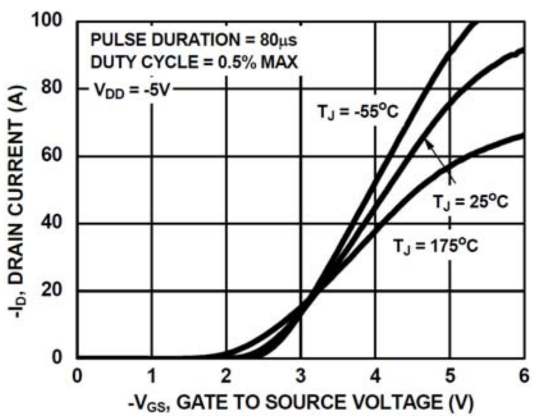


Figure 7. Transfer Characteristics

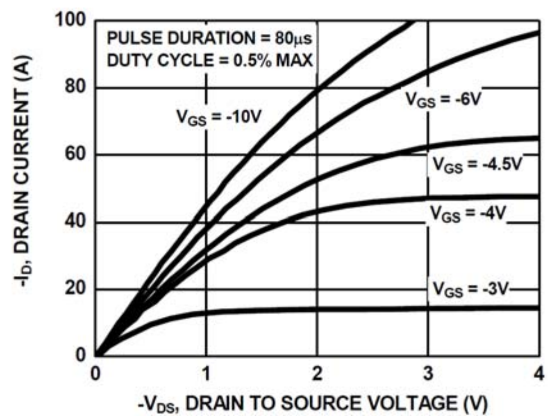


Figure 8. Saturation Characteristics

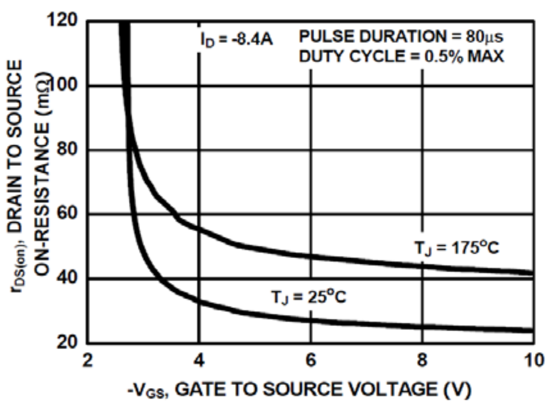


Figure 9. Drain to Source On-Resistance Variation vs. Gate to Source Voltage

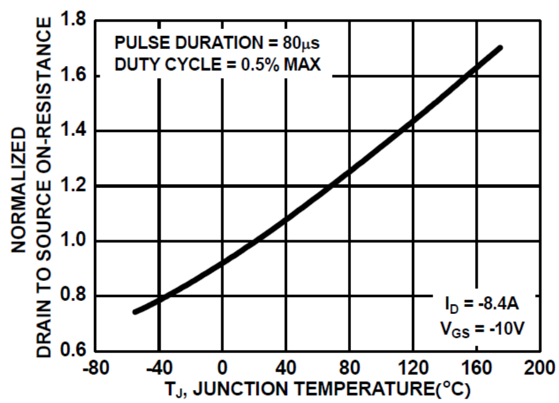


Figure 10. Normalized Drain to Source On Resistance vs. Junction Temperature

Typical Characteristics

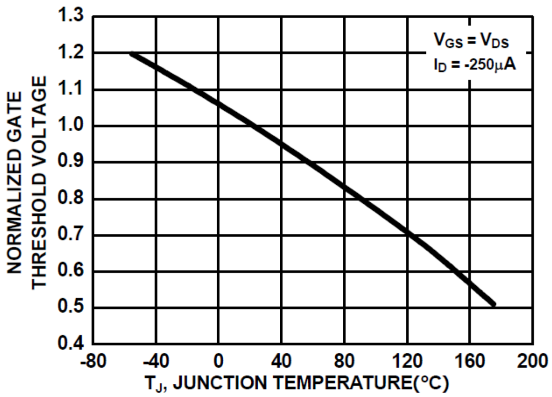


Figure 11. Normalized Gate Threshold Voltage vs. Junction Temperature

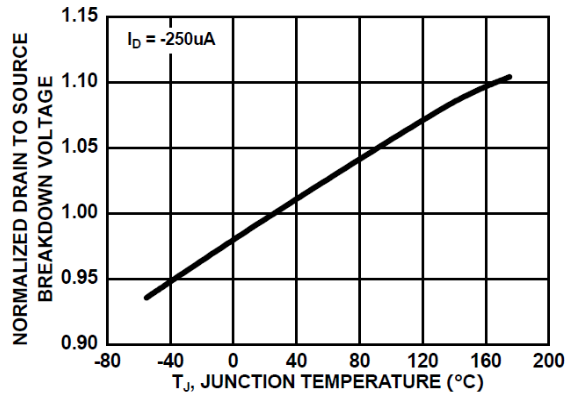


Figure 12. Normalized Drain to Source Breakdown Voltage vs. Junction Temperature

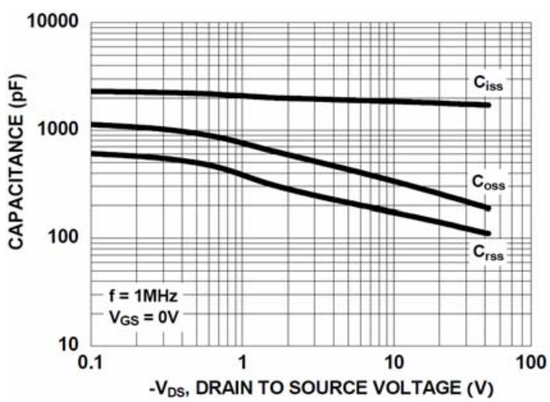


Figure 13. Capacitance vs. Drain to Source Voltage

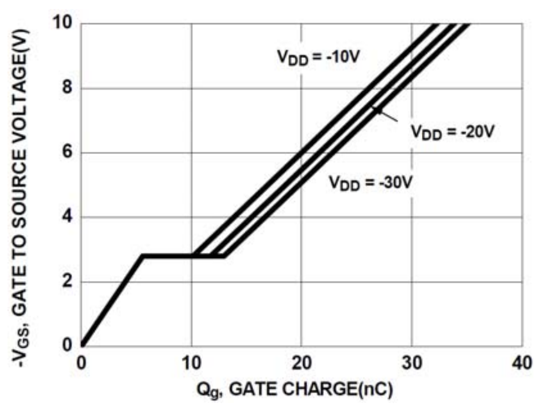


Figure 14. Gate charge vs. Gate to Source Voltage

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