



ON Semiconductor®

## FDP5500-F085

### N-Channel UltraFET Power MOSFET

55V, 80A, 7mΩ

#### Features

- Typ  $r_{DS(on)}$  = 5.1mΩ at  $V_{GS} = 10V$ ,  $I_D = 80A$
- Typ  $Q_{g(10)}$  = 114nC at  $V_{GS} = 10V$
- Simulation Models
  - Temperature Compensated PSPICE and SABER™ Models
- Peak Current vs Pulse Width Curve
- UIS Rating Curve
- Qualified to AEC Q101
- RoHS Compliant

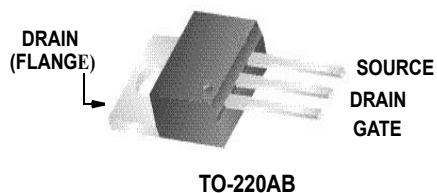
#### Applications

- DC Linear Mode Control
- Solenoid and Motor Control
- Switching Regulators
- Automotive Systems

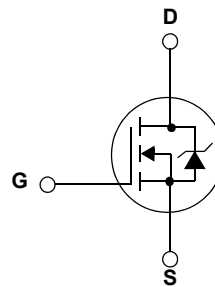


FDP5500-F085 N-Channel UltraFET Power MOSFET

#### Package



#### Symbol



## MOSFET Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Ratings	Units
$V_{DSS}$	Drain to Source Voltage	(Note 1)	55	V
$V_{DGR}$	Drain to Gate Voltage ( $R_{GS} = 20k\Omega$ )	(Note 1)	55	V
$V_{GS}$	Gate to Source Voltage		$\pm 20$	V
$I_D$	Drain Current Continuous ( $T_C < 135^\circ\text{C}$ , $V_{GS} = 10\text{V}$ )		80	A
	Pulsed		See Figure 4	
$E_{AS}$	Single Pulse Avalanche Energy	(Note 2)	860	mJ
$P_D$	Power Dissipation		375	W
	Derate above $25^\circ\text{C}$		2.5	W/ $^\circ\text{C}$
$T_J, T_{STG}$	Operating and Storage Temperature		-55 to +175	$^\circ\text{C}$
$T_L$	Max. Lead Temp. for Soldering (at 1.6mm from case for 10sec)		300	
$T_{pkg}$	Max. Package Temp. for Soldering (Package Body for 10sec)		260	

## Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance Junction to Case	0.4	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient TO-220AB, 1in <sup>2</sup> copper pad area	62	$^\circ\text{C}/\text{W}$

## Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDP5500	FDP5500-F085	TO-220AB	Tube	N/A	50 units

## Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
--------	-----------	-----------------	-----	-----	-----	-------

### Off Characteristics

$B_{VDSS}$	Drain to Source Breakdown Voltage	$I_D = 250\mu\text{A}$ , $V_{GS} = 0\text{V}$	55	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 50\text{V}$ , $V_{GS} = 0\text{V}$	-	-	1	$\mu\text{A}$
		$V_{DS} = 45\text{V}$ , $T_C = 150^\circ\text{C}$	-	-	250	
$I_{GSS}$	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{V}$	-	-	$\pm 100$	nA

### On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$ , $I_D = 250\mu\text{A}$	2	2.8	4	V
$r_{DS(on)}$	Drain to Source On Resistance	$I_D = 80\text{A}$ , $V_{GS} = 10\text{V}$	-	5.1	7	m $\Omega$

### Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = 25\text{V}$ , $V_{GS} = 0\text{V}$ , $f = 1\text{MHz}$	-	3565	-	pF	
$C_{oss}$	Output Capacitance		-	1310	-	pF	
$C_{rss}$	Reverse Transfer Capacitance		-	395	-	pF	
$Q_{g(TOT)}$	Total Gate Charge at 20V	$V_{GS} = 0$ to 20V	$V_{DD} = 30\text{V}$ $I_D = 80\text{A}$ $R_L = 0.4\Omega$ $I_g = 1.0\text{mA}$	-	207	269	nC
$Q_{g(10)}$	Total Gate Charge at 10V	$V_{GS} = 0$ to 10V		-	114	148	nC
$Q_{g(TH)}$	Threshold Gate Charge	$V_{GS} = 0$ to 2V		-	6.6	8.6	nC
$Q_{gs}$	Gate to Source Gate Charge			-	17.2	-	nC
$Q_{gd}$	Gate to Drain "Miller" Charge			-	52	-	nC

**Electrical Characteristics**  $T_C = 25^\circ\text{C}$  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	$V_{DD} = 30\text{V}$ , $I_D = 80\text{A}$ , $R_L = 0.4\Omega$ , $V_{GS} = 10\text{V}$ , $R_{GS} = 2.5\Omega$	-	-	75	ns
$t_{d(on)}$	Turn-On Delay Time		-	12	-	ns
$t_r$	Rise Time		-	34	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	37	-	ns
$t_f$	Fall Time		-	23	-	ns
$t_{off}$	Turn-Off Time		-	-	96	ns

**Drain-Source Diode Characteristics**

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$V_{SD}$	Source to Drain Diode Voltage	$I_{SD} = 80\text{A}$	-	0.9	1.25	V
$t_{rr}$	Reverse Recovery Time	$I_F = 80\text{A}$ , $dI_{SD}/dt = 100\text{A}/\mu\text{s}$	-	58	75	ns
$Q_{rr}$	Reverse Recovery Charge		-	71	92	nC

**Notes:**

- 1: Starting  $T_J = 25^\circ\text{C}$  to  $175^\circ\text{C}$ .
- 2: Starting  $T_J = 25^\circ\text{C}$ ,  $L = 0.42\text{mH}$ ,  $I_{AS} = 64\text{A}$

### Typical Characteristics

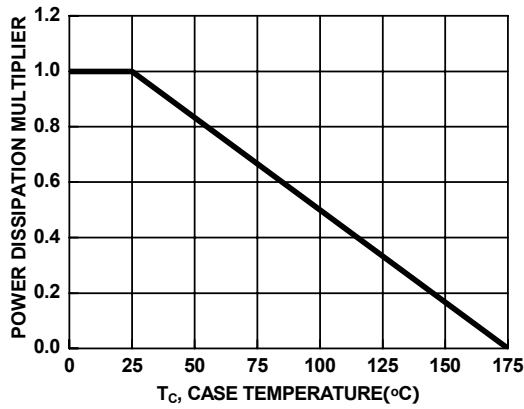


Figure 1. Normalized Power Dissipation vs Case Temperature

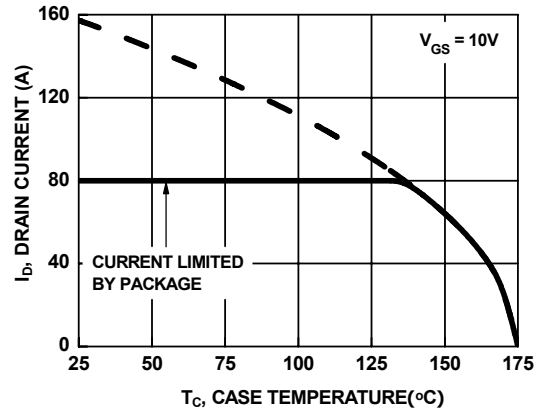


Figure 2. Maximum Continuous Drain Current vs Case Temperature

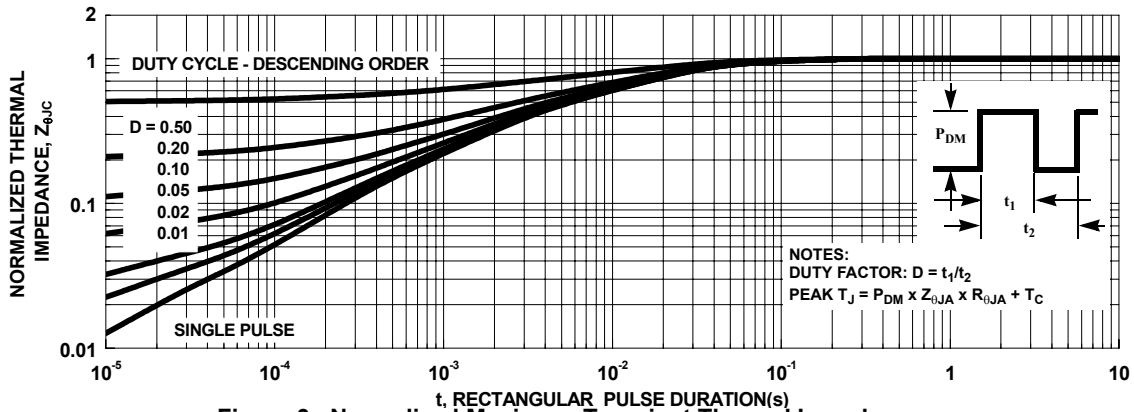


Figure 3. Normalized Maximum Transient Thermal Impedance

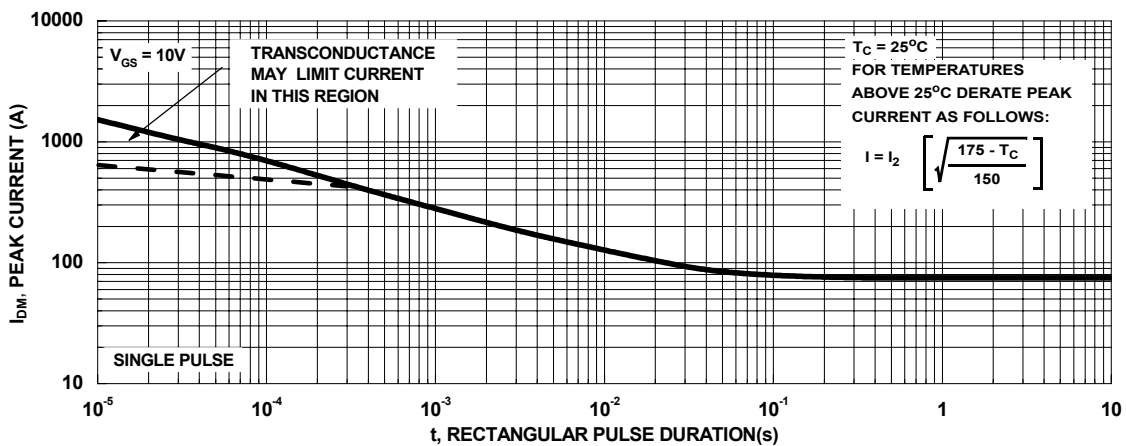


Figure 4. Peak Current Capability

## Typical Characteristics

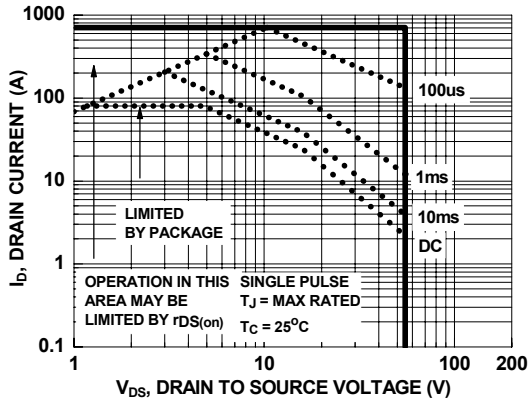
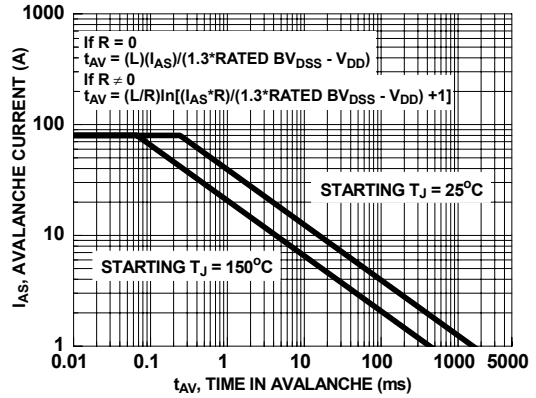


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to ON Semiconductor Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching Capability

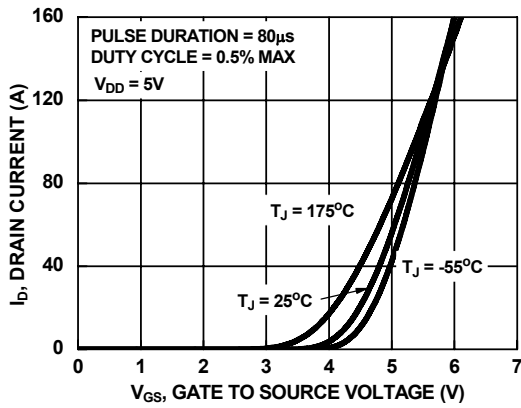


Figure 7. Transfer Characteristics

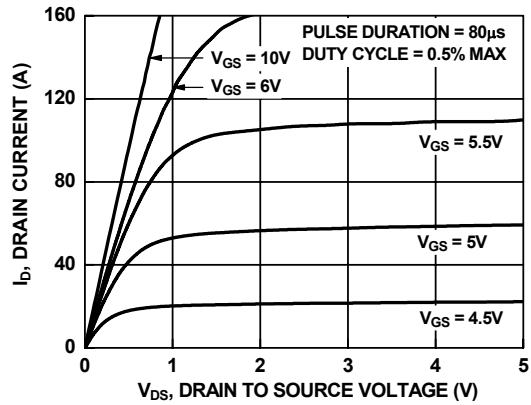


Figure 8. Saturation Characteristics

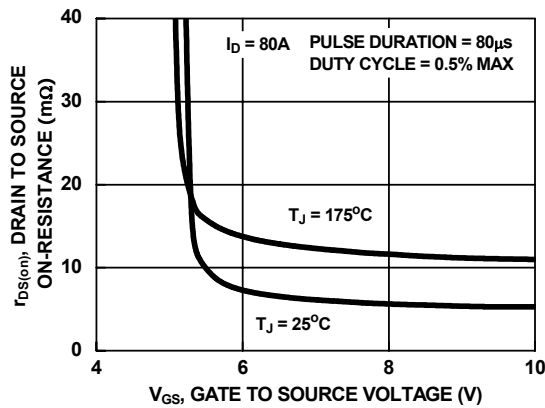


Figure 9. Drain to Source On-Resistance Variation vs Gate to Source Voltage

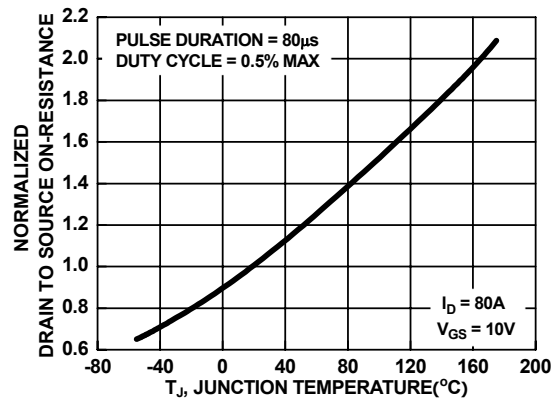


Figure 10. Normalized Drain to Source On-Resistance vs Junction Temperature

## Typical Characteristics

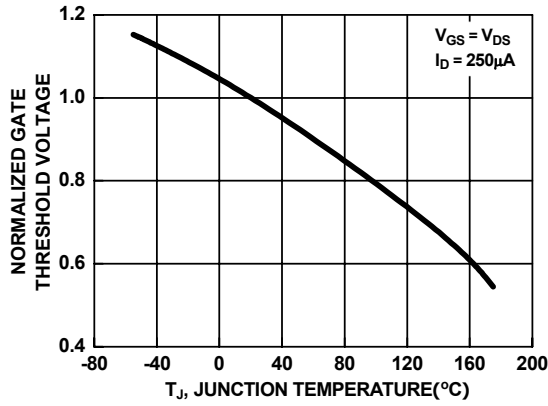


Figure 11. Normalized Gate Threshold Voltage vs Junction Temperature

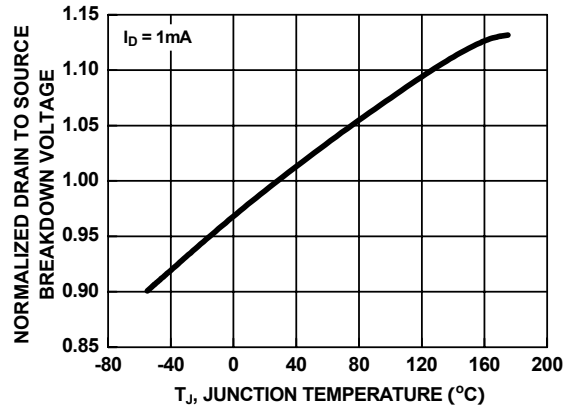


Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

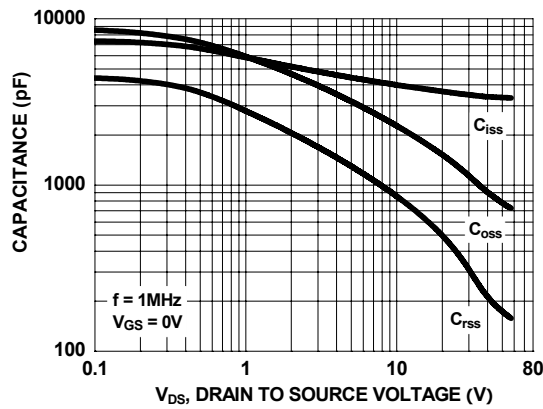


Figure 13. Capacitance vs Drain to Source Voltage

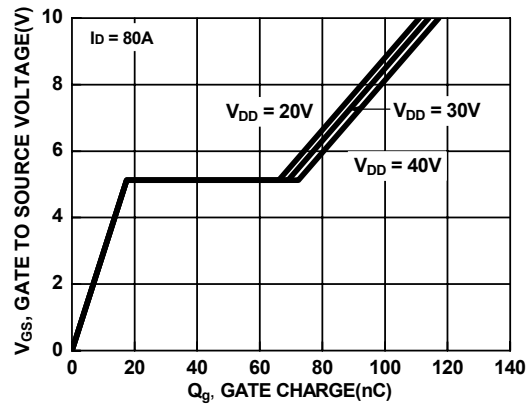


Figure 14. Gate Charge vs Gate to Source Voltage

ON Semiconductor and  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](http://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](mailto: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](http://www.onsemi.com)  
**Order Literature:** <http://www.onsemi.com/orderlit>  
For additional information, please contact your local  
Sales Representative