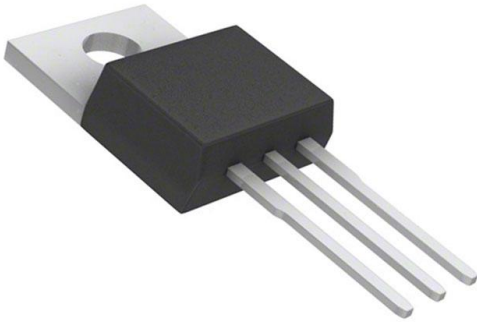


# FDP8443-F085 Datasheet

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DiGi Electronics Part Number	FDP8443-F085-DG
Manufacturer	<a href="#">onsemi</a>
Manufacturer Product Number	FDP8443-F085
Description	MOSFET N-CH 40V 20A/80A TO220-3
Detailed Description	N-Channel 40 V 20A (Ta), 80A (Tc) 188W (Tc) Through Hole TO-220-3



Tel: +00 852-30501935

RFQ Email: [Info@DiGi-Electronics.com](mailto:Info@DiGi-Electronics.com)

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## Purchase and inquiry

Manufacturer Product Number:

FDP8443-F085

Series:

PowerTrench®

FET Type:

N-Channel

Drain to Source Voltage (Vdss):

40 V

Drive Voltage (Max Rds On, Min Rds On):

10V

Vgs(th) (Max) @ Id:

4V @ 250µA

Vgs (Max):

±20V

FET Feature:

-

Operating Temperature:

-55°C ~ 175°C (Tj)

Qualification:

AEC-Q101

Supplier Device Package:

TO-220-3

Base Product Number:

FDP84

Manufacturer:

onsemi

Product Status:

Obsolete

Technology:

MOSFET (Metal Oxide)

Current - Continuous Drain (Id) @ 25°C:

20A (Ta), 80A (Tc)

Rds On (Max) @ Id, Vgs:

3.5mOhm @ 80A, 10V

Gate Charge (Qg) (Max) @ Vgs:

185 nC @ 10 V

Input Capacitance (Ciss) (Max) @ Vds:

9310 pF @ 25 V

Power Dissipation (Max):

188W (Tc)

Grade:

Automotive

Mounting Type:

Through Hole

Package / Case:

TO-220-3

## Environmental & Export classification

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99

REACH Status:

REACH Unaffected

HTSUS:

8541.29.0095

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The logo for onsemi, featuring the word "onsemi" in a dark teal, lowercase, sans-serif font. The letter "i" is stylized with a white dot and a teal vertical bar. A small orange triangle is positioned above the top right of the "i". A trademark symbol (TM) is located to the right of the logo.

To learn more about onsemi™, please visit our website at  
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ON Semiconductor®

## FDP8443-F085

### N-Channel PowerTrench<sup>®</sup> MOSFET

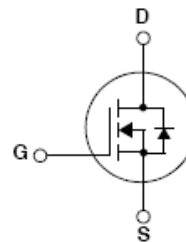
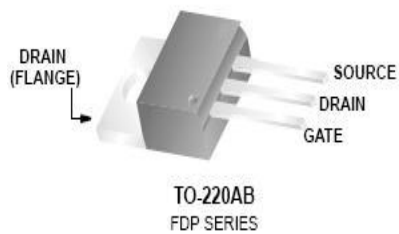
40V, 80A, 3.5mΩ

#### Features

- Typ  $r_{DS(on)}$  = 2.7mΩ at  $V_{GS} = 10V$ ,  $I_D = 80A$
- Typ  $Q_{g(10)}$  = 142nC 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 Architecture and VRMs
- Primary Switch for 12V Systems



FDP8443-F085 N-Channel PowerTrench<sup>®</sup> MOSFET

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

Symbol	Parameter	Ratings	Units
$V_{DSS}$	Drain to Source Voltage	40	V
$V_{GS}$	Gate to Source Voltage	$\pm 20$	V
$I_D$	Drain Current Continuous ( $T_C < 144^\circ\text{C}$ , $V_{GS} = 10\text{V}$ )	80	A
	Continuous ( $T_{amb} = 25^\circ\text{C}$ , $V_{GS} = 10\text{V}$ , with $R_{\theta JA} = 62^\circ\text{C/W}$ )	20	
	Pulsed	See Figure 4	
$E_{AS}$	Single Pulse Avalanche Energy (Note 1)	531	mJ
$P_D$	Power Dissipation	188	W
	Derate above $25^\circ\text{C}$	1.25	W/ $^\circ\text{C}$
$T_J, T_{STG}$	Operating and Storage Temperature	-55 to +175	$^\circ\text{C}$

**Thermal Characteristics**

$R_{\theta JC}$	Thermal Resistance Junction to Case	0.8	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient (Note 2)	62	$^\circ\text{C/W}$

**Package Marking and Ordering Information**

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDP8443	FDP8443-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
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**Off Characteristics**

$B_{VDSS}$	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	$V_{DS} = 32\text{V}$ , $V_{GS} = 0\text{V}$	-	-	1	$\mu\text{A}$
		$T_C = 150^\circ\text{C}$	-	-	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	$I_D = 80\text{A}$ , $V_{GS} = 10\text{V}$	-	2.7	3.5	m $\Omega$
		$I_D = 80\text{A}$ , $V_{GS} = 10\text{V}$ , $T_J = 175^\circ\text{C}$	-	4.7	6.1	

**Dynamic Characteristics**

$C_{iss}$	Input Capacitance	$V_{DS} = 25\text{V}$ , $V_{GS} = 0\text{V}$ , $f = 1\text{MHz}$	-	9310	-	pF
$C_{oss}$	Output Capacitance		-	800	-	pF
$C_{rss}$	Reverse Transfer Capacitance		-	510	-	pF
$R_G$	Gate Resistance	$V_{GS} = 0.5\text{V}$ , $f = 1\text{MHz}$	-	0.9	-	$\Omega$
$Q_{g(TOT)}$	Total Gate Charge at 10V	$V_{GS} = 0$ to 10V	-	142	185	nC
$Q_{g(TH)}$	Threshold Gate Charge	$V_{GS} = 0$ to 2V	-	17.5	23	nC
$Q_{gs}$	Gate to Source Gate Charge	$V_{DD} = 20\text{V}$ $I_D = 35\text{A}$ $I_g = 1\text{mA}$	-	36	-	nC
$Q_{gs2}$	Gate Charge Threshold to Plateau		-	18.8	-	nC
$Q_{gd}$	Gate to Drain "Miller" Charge		-	32	-	nC

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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**Switching Characteristics** ( $V_{GS} = 10\text{V}$ )

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$t_{on}$	Turn-On Time	$V_{DD} = 20\text{V}$ , $I_D = 35\text{A}$ $V_{GS} = 10\text{V}$ , $R_{GS} = 2\Omega$	-	-	58	ns
$t_{d(on)}$	Turn-On Delay Time		-	18.4	-	ns
$t_r$	Rise Time		-	17.9	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	55	-	ns
$t_f$	Fall Time		-	13.5	-	ns
$t_{off}$	Turn-Off Time		-	-	109	ns

**Drain-Source Diode Characteristics**

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$V_{SD}$	Source to Drain Diode Voltage	$I_{SD} = 35\text{A}$	-	0.8	1.25	V
		$I_{SD} = 15\text{A}$	-	0.8	1.0	
$t_{rr}$	Reverse Recovery Time	$I_{SD} = 35\text{A}$ , $dI_{SD}/dt = 100\text{A}/\mu\text{s}$	-	42	55	ns
$Q_{rr}$	Reverse Recovery Charge		-	48	62	nC

**Notes:**

- 1: Starting  $T_J = 25^\circ\text{C}$ ,  $L = 0.26\text{mH}$ ,  $I_{AS} = 64\text{A}$ .
- 2: Pulse width = 100s.

### Typical Characteristics

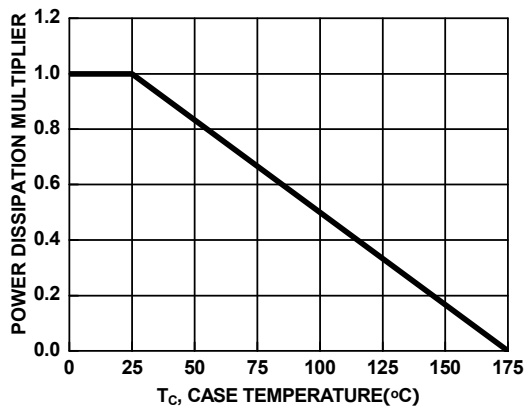


Figure 1. Normalized Power Dissipation vs Case Temperature

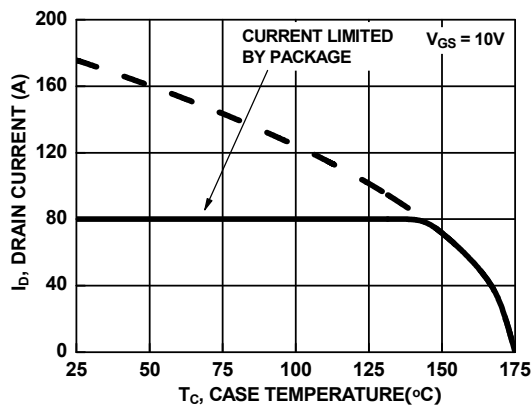


Figure 2. Maximum Continuous Drain Current vs Case Temperature

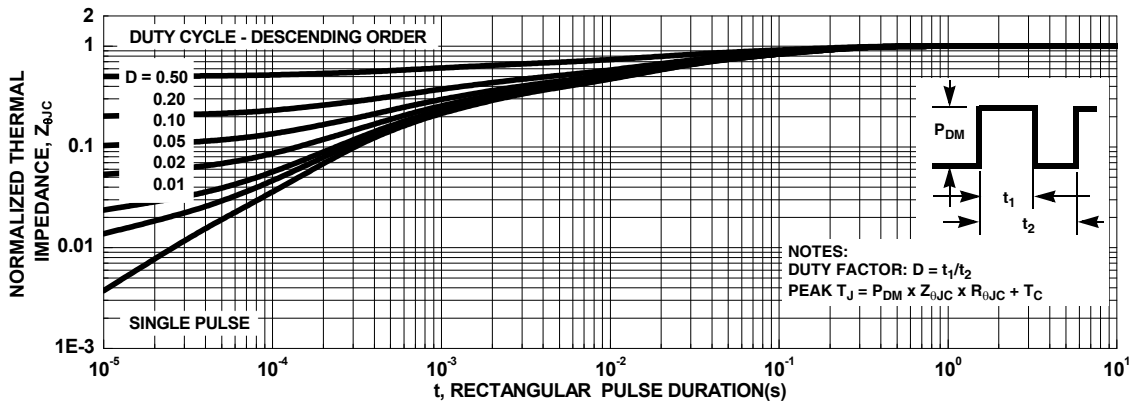


Figure 3. Normalized Maximum Transient Thermal Impedance

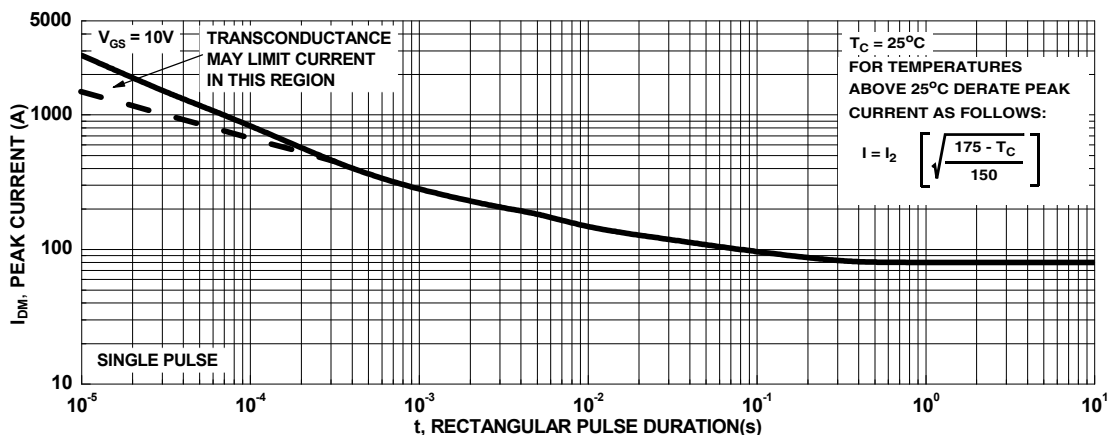
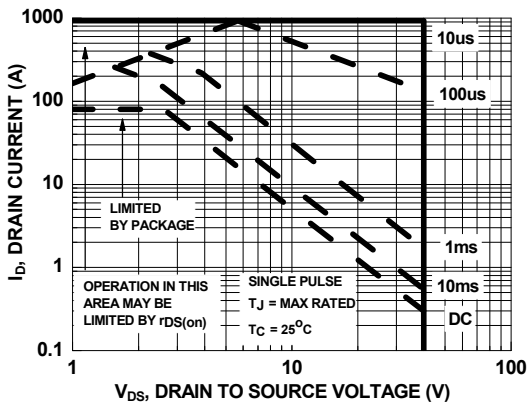
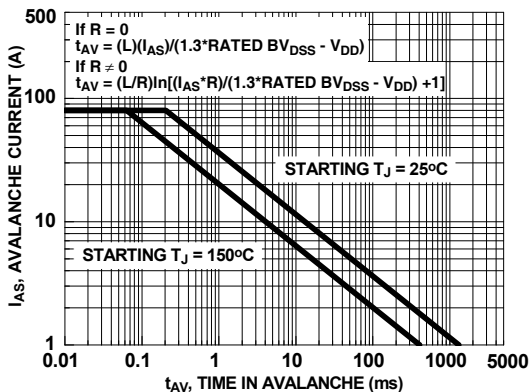


Figure 4. Peak Current Capability

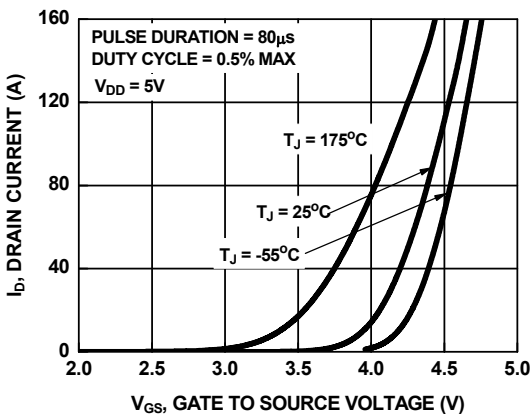
**Typical Characteristics**



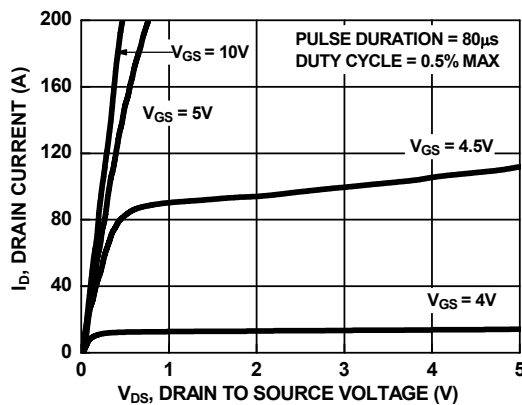
**Figure 5. Forward Bias Safe Operating Area**



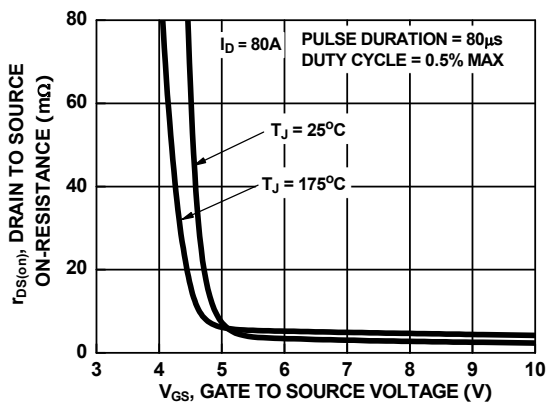
**Figure 6. Unclamped Inductive Switching Capability**



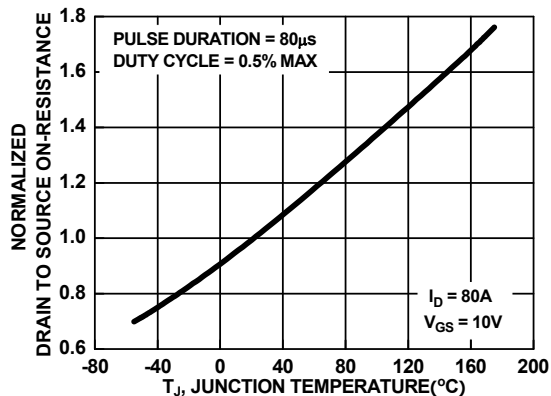
**Figure 7. Transfer Characteristics**



**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

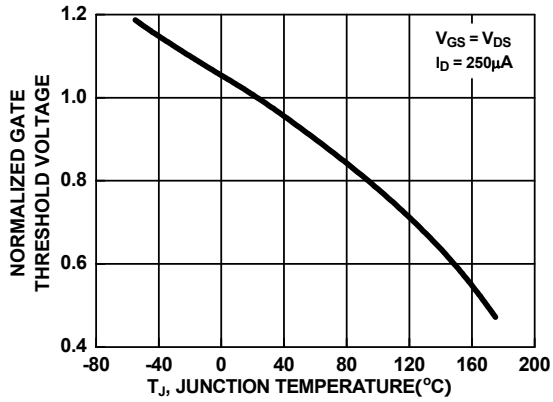


Figure 11. Normalized Gate Threshold Voltage vs Junction Temperature

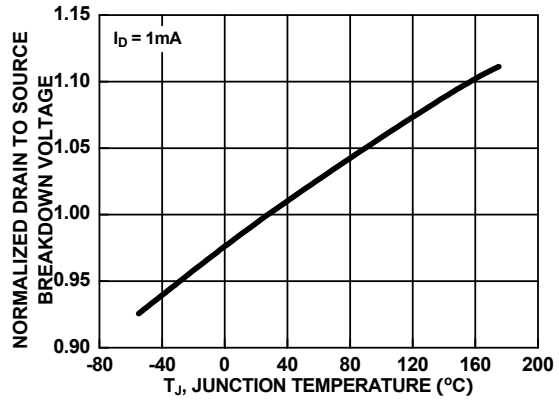


Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

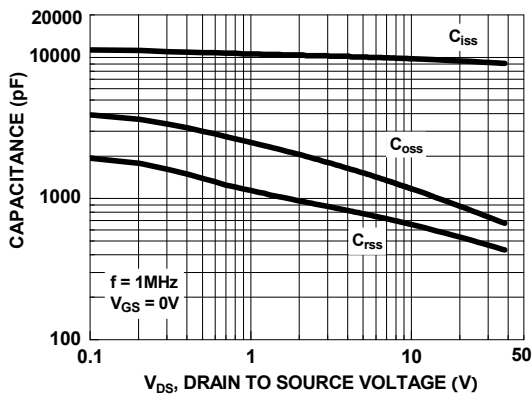


Figure 13. Capacitance vs Drain to Source Voltage

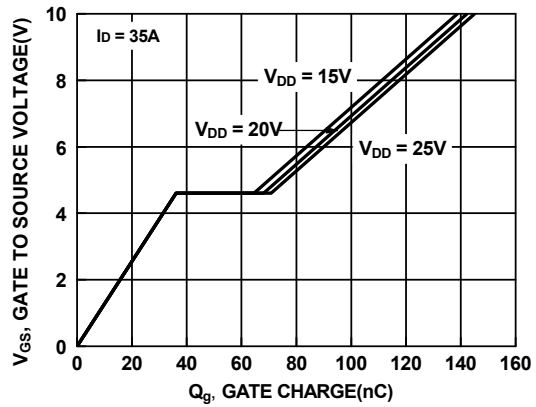



Figure 14. Gate Charge vs Gate to Source Voltage

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