



FDPF190N15A

N-Channel PowerTrench® MOSFET

150V, 27.4A, 19mΩ

Features

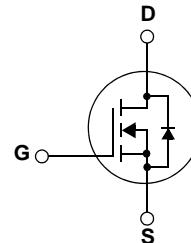
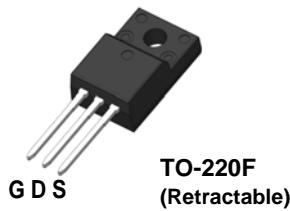
- $R_{DS(on)} = 14.7\text{m}\Omega$ (Typ.) @ $V_{GS} = 10\text{V}$, $I_D = 27.4\text{A}$
- Low Gate Charge (Typ. 30nC)
- Low C_{rss} (Typ. 56pF)
- Fast Switching
- 100% Avalanche Tested
- Improved dv/dt Capability
- RoHS Compliant

Description

This N-Channel MOSFET is produced using Fairchild Semiconductor's advance PowerTrench process that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

Application

- DC to DC Converters
- Synchronous Rectification for Server/Telecom PSU
- Battery Charger
- AC motor drives and Uninterruptible Power Supplies
- Off-line UPS



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

Symbol	Parameter		Rating	Units
V_{DSS}	Drain to Source Voltage		150	V
V_{GSS}	Gate to Source Voltage		± 20	V
I_D	Drain Current	- Continuous ($T_C = 25^\circ\text{C}$)	27.4	A
		- Continuous ($T_C = 100^\circ\text{C}$)	17.4	
I_{DM}	Drain Current	- Pulsed	(Note 1)	A
E_{AS}	Single Pulsed Avalanche Energy		(Note 2)	mJ
dv/dt	Peak Diode Recovery dv/dt		(Note 3)	V/ns
P_D	Power Dissipation	($T_C = 25^\circ\text{C}$)	33	W
		- Derate above 25°C	0.26	
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	°C
T_L	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds		300	°C

Thermal Characteristics

Symbol	Parameter	Rating	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	3.8	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	62.5	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDPF190N15A	FDPF190N15A	TO-220F	-	-	50

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

BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	150	-	-	V
$\Delta \text{BV}_{\text{DSS}} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250\mu\text{A}, \text{Referenced to } 25^\circ\text{C}$	-	0.14	-	$\text{V}/^\circ\text{C}$
$I_{\text{DS}(\text{SS})}$	Zero Gate Voltage Drain Current	$V_{DS} = 120\text{V}, V_{GS} = 0\text{V}$	-	-	1	μA
		$V_{DS} = 120\text{V}, T_C = 150^\circ\text{C}$	-	-	500	
I_{GSS}	Gate to Body Leakage Current	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$	-	-	± 100	nA

On Characteristics

$V_{GS(\text{th})}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\mu\text{A}$	2.0	-	4.0	V
$R_{DS(\text{on})}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{V}, I_D = 27.4\text{A}$	-	14.7	19.0	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS} = 10\text{V}, I_D = 27.4\text{A}$ (Note 4)	-	64	-	S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 25\text{V}, V_{GS} = 0\text{V}$ $f = 1\text{MHz}$	-	2020	2685	pF
C_{oss}	Output Capacitance		-	700	930	pF
C_{rss}	Reverse Transfer Capacitance		-	56	85	pF
$C_{oss(er)}$	Energy Related Output Capacitance	$V_{DS} = 75\text{V}, V_{GS} = 0\text{V}$	-	252	-	pF
$Q_{g(\text{tot})}$	Total Gate Charge at 10V	$V_{DS} = 120\text{V}, I_D = 27.4\text{A}$	-	30	39	nC
Q_{gs}	Gate to Source Gate Charge	$V_{GS} = 10\text{V}$	-	8.8	-	nC
Q_{gd}	Gate to Drain "Miller" Charge		-	7.3	-	nC

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 75\text{V}, I_D = 27.4\text{A}$ $V_{GS} = 10\text{V}, R_{\text{GEN}} = 4.7\Omega$	-	18	46	ns	
t_r	Turn-On Rise Time		-	16	42	ns	
$t_{d(off)}$	Turn-Off Delay Time		-	32	74	ns	
t_f	Turn-Off Fall Time		(Note 4, 5)	-	8	26	ns
ESR	Equivalent Series Resistance (G-S)	$f = 1\text{MHz}$		-	1.5	-	Ω

Drain-Source Diode Characteristics

I_S	Maximum Continuous Drain to Source Diode Forward Current	-	-	27.4	A	
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current	-	-	110	A	
V_{SD}	Drain to Source Diode Forward Voltage	$V_{GS} = 0\text{V}, I_{SD} = 27.4\text{A}$	-	-	1.3	V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0\text{V}, I_{SD} = 27.4\text{A}$	-	76	-	ns
Q_{rr}	Reverse Recovery Charge	$dI_F/dt = 100\text{A}/\mu\text{s}, V_{DD} = 120\text{V}$ (Note 4)	-	0.18	-	μC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $L = 3\text{mH}, I_{AS} = 13.2\text{A}, R_G = 25\Omega, \text{Starting } T_J = 25^\circ\text{C}$
3. $I_{SD} \leq 27.4\text{A}, dI/dt \leq 200\text{A}/\mu\text{s}, V_{DD} \leq \text{BV}_{\text{DSS}}, \text{Starting } T_J = 25^\circ\text{C}$
4. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Dual Cycle $\leq 2\%$
5. Essentially Independent of Operating Temperature Typical Characteristics

Typical Performance Characteristics

Figure 1. On-Region Characteristics

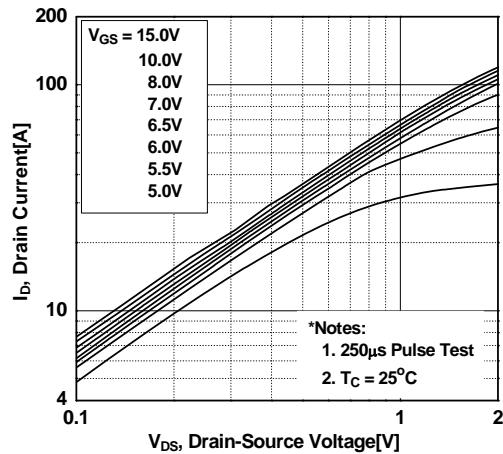


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

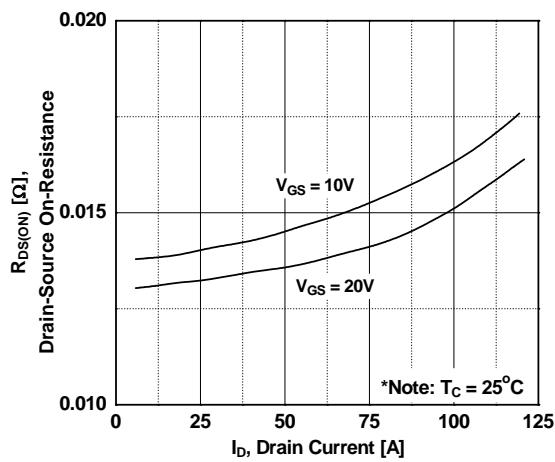


Figure 5. Capacitance Characteristics

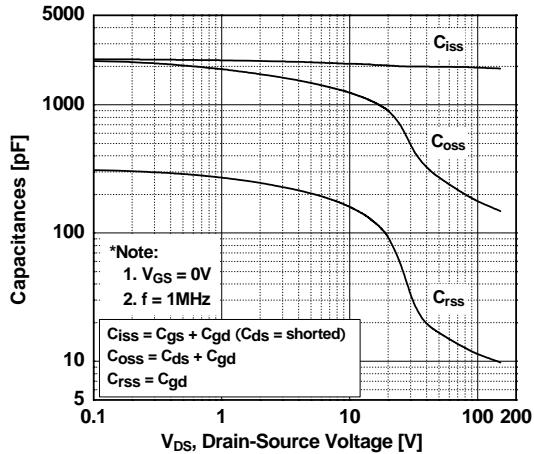


Figure 2. Transfer Characteristics

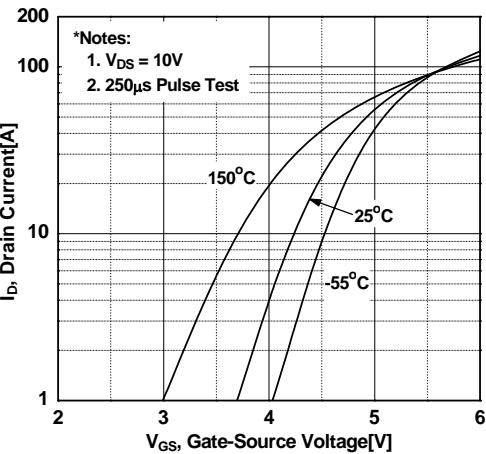


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

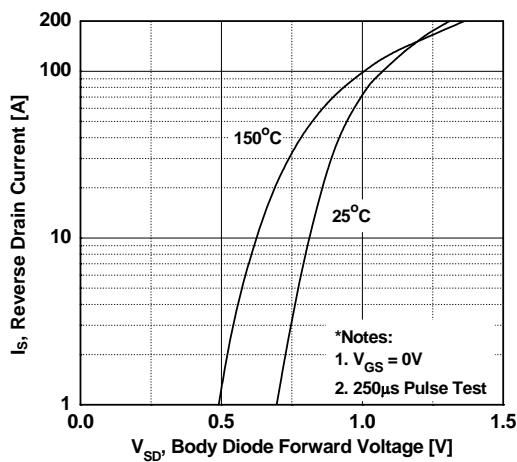


Figure 6. Gate Charge Characteristics

