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November 2015

FDPF190N15A

N-Channel PowerTrench[®] MOSFET 150 V, 27.4 A, 19 m Ω

Features

- $R_{DS(on)}$ = 14.7 m Ω (Typ.) @ V_{GS} = 10 V, I_D = 27.4 A
- Low Gate Charge, Q_G = 31 nC (Typ.)
- Low C_{rss} (Typ. 56 pF)
- · Fast Switching Speed
- · Improved dv/dt Capability
- · RoHS Compliant

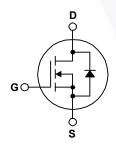
Description

This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench® process that has been tailored to minimize the on-state resistance while maintaining superior switching performance.

Applications

- · Consumer Appliances
- LED TV
- · Synchronous Rectification for ATX / Sever / Telecom PSU
- · Uninterruptible Power Supply
- · Micro Solar Inverter





Absolute Maximum Ratings T_C = 25°C unless otherwise noted.

Symbol		Parameter		FDPF190N15A	Unit
V_{DSS}	Drain to Source Voltage			150	V
V	Cata to Source Voltage	- DC		±20	V
V_{GSS}	Gate to Source Voltage	- AC	(f > 1 Hz)	±30	V
I _D	Drain Current	- Continuous (T _C = 25°C)		27.4	А
		- Continuous (T _C = 100°C)		17.4	
I _{DM}	Drain Current	- Pulsed	(Note 1)	110	Α
E _{AS}	Single Pulsed Avalanche En	ergy	(Note 2)	261	mJ
dv/dt	Peak Diode Recovery dv/dt		(Note 3)	6.0	V/ns
D	Dower Dissinction	$(T_C = 25^{\circ}C)$		33	W
P_{D}	Power Dissipation	- Derate Above 25°C		0.26	W/°C
T _J , T _{STG}	Operating and Storage Temp	perature Range		-55 to +150	οС
T _L	Maximum Lead Temperature	e for Soldering, 1/8" from Case for 5 S	Seconds	300	°C

Thermal Characteristics

Symbol	Parameter	FDPF190N15A	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	3.3	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	62.5	*6/44

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FDPF190N15A	FDPF190N15A	TO-220F	Tube	N/A	N/A	50 units

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

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
Off Charac	cteristics					
BV _{DSS}	Drain to Source Breakdown Voltage	$I_D = 250 \mu A, V_{GS} = 0 V$	150	-	-	V
ΔBV _{DSS} / ΔΤ _J	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C	-	0.14	-	V/°C
I	Zero Gate Voltage Drain Current	V _{DS} = 120 V, V _{GS} = 0 V	-	-	1	цΑ
IDSS	Zero Gate voltage Drain Current	$V_{DS} = 120 \text{ V}, T_{C} = 150^{\circ}\text{C}$	-	-	500	μΑ
I _{GSS}	Gate to Body Leakage Current	V _{GS} = ±20 V, V _{DS} = 0 V	-	-	±100	nA

On Characteristics

V _{GS(th)}	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_{D} = 250 \mu A$	2.0	-	4.0	V
R _{DS(on)}	Static Drain to Source On Resistance	$V_{GS} = 10 \text{ V}, I_D = 27.4 \text{ A}$	1	14.7	19.0	mΩ
g _{FS}	Forward Transconductance	V _{DS} = 10 V, I _D = 27.4 A	-	64	-	S

Dynamic Characteristics

C _{iss}	Input Capacitance	V _{DS} = 25 V, V _{GS} = 0 V, f = 1 MHz	-	2020	2685	pF
C _{oss}	Output Capacitance		-	700	930	pF
C _{rss}	Reverse Transfer Capacitance	1 - 1 WH 12	-	56	85	pF
C _{oss(er)}	Energy Related Output Capacitance	$V_{DS} = 75 \text{ V}, V_{GS} = 0 \text{ V}$	-	252	-	pF
$Q_{g(tot)}$	Total Gate Charge at 10V	V _{DS} = 120 V, I _D = 27.4 A,	-	30	39	nC
Q_{gs}	Gate to Source Gate Charge	V _{GS} = 10 V	-	8.8	-	nC
Q_{gd}	Gate to Drain "Miller" Charge	(Note 4)	-	7.3	-	nC
ESR	Equivalent Series Resistance (G-S)	f = 1 MHz	-	1.5	-	Ω

Switching Characteristics

t _{d(on)}	Turn-On Delay Time			-	18	46	ns
t _r	Turn-On Rise Time	$V_{DD} = 75 \text{ V}, I_{D} = 27.4 \text{ A},$		- /	16	42	ns
t _{d(off)}	Turn-Off Delay Time	V_{GS} = 10 V, R_{G} = 4.7 Ω		-/	32	74	ns
t _f	Turn-Off Fall Time		(Note 4)	-	8	26	ns

Drain-Source Diode Characteristics

I _S	Maximum Continuous Drain to Source Diode Forward Current			-	27.4	Α
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current			-	110	Α
V_{SD}	Drain to Source Diode Forward Voltage V _{GS} = 0 V, I _{SD} = 27.4 A		-	-	1.3	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _{SD} = 27.4 A,	-	76	-	ns
Q _{rr}	Reverse Recovery Charge	$dI_F/dt = 100 \text{ A/}\mu\text{s}, V_{DD} = 120 \text{ V}$	-	0.18	-	μС

Notes

- 1. Repetitive rating: pulse-width limited by maximum junction temperature.
- 2. L = 0.33 mH, I_{AS} = 29 A, R_G = 25 Ω , starting T_J = 25°C.
- 3. $I_{SD} \le 27.4$ A, di/dt ≤ 200 A/ μ s, $V_{DD} \le BV_{DSS}$, starting T_J = 25°C.
- 4. Essentially independent of operating temperature typical characteristics.

Typical Performance Characteristics

Figure 1. On-Region Characteristics

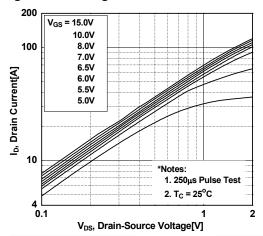


Figure 3. On-Resistance Variation vs.

Drain Current and Gate Voltage

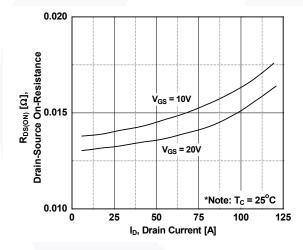


Figure 5. Capacitance Characteristics

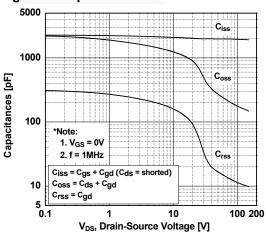


Figure 2. Transfer Characteristics

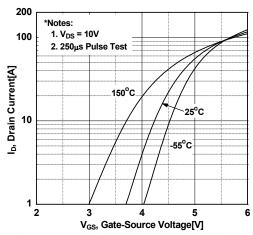


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

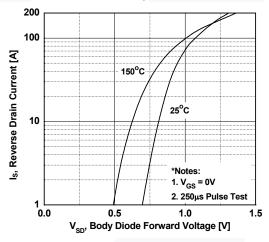
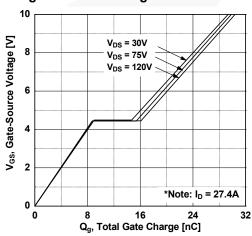


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

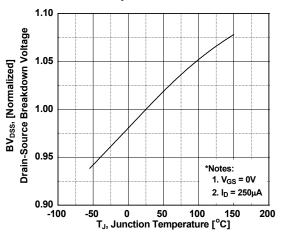


Figure 8. On-Resistance Variation vs. Temperature

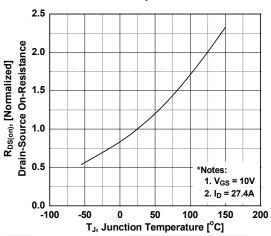


Figure 9. Maximum Safe Operating Area

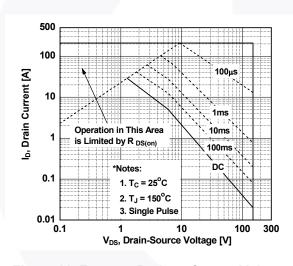


Figure 10. Maximum Drain Current vs. Case Temperature

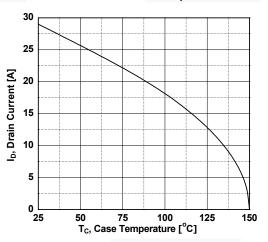
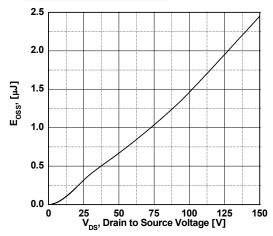
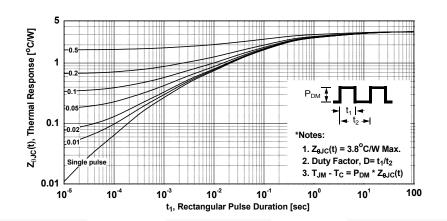


Figure 11. Eoss vs. Drain to Source Voltage



Typical Performance Characteristics (Continued)





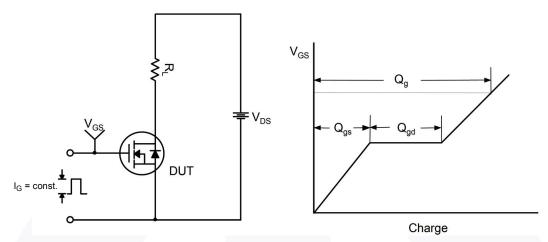


Figure 13. Gate Charge Test Circuit & Waveform

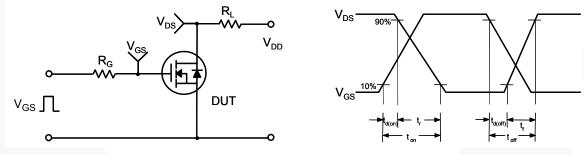


Figure 14. Resistive Switching Test Circuit & Waveforms

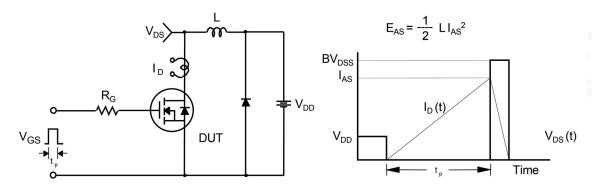


Figure 15. Unclamped Inductive Switching Test Circuit & Waveforms

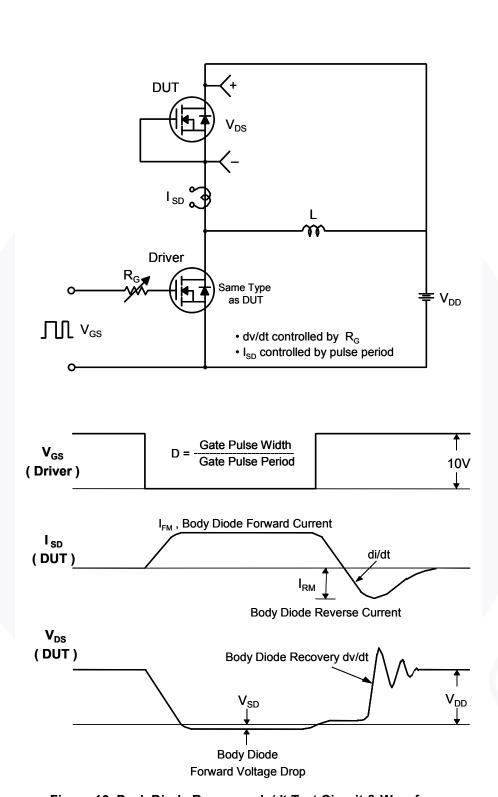
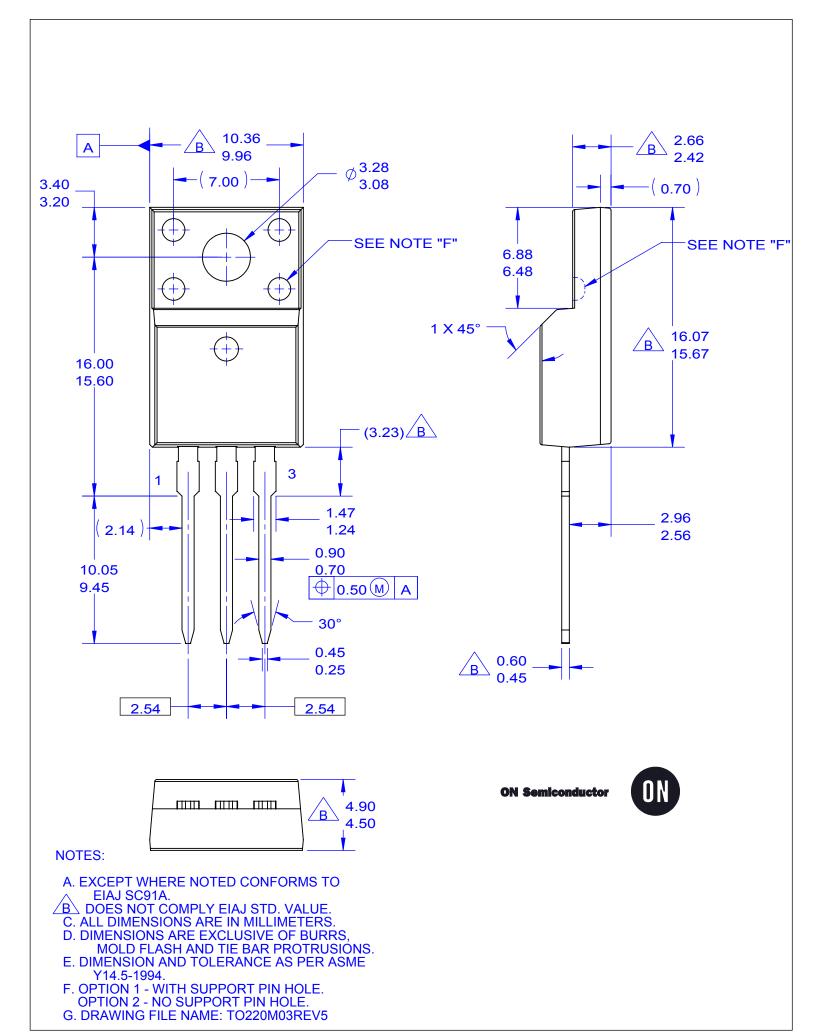


Figure 16. Peak Diode Recovery dv/dt Test Circuit & Waveforms



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