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December 2013

FDPF320N06L

N-Channel Logic Level PowerTrench[®] MOSFET 60 V, 21 A, 25 m Ω

Features

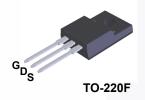
- $R_{DS(on)}$ = 20 m Ω (Typ.) @ V_{GS} = 10 V, I_D = 21 A
- $R_{DS(on)}$ = 23 m Ω (Typ.) @ V_{GS} = 5 V, I_D = 17 A
- · Low Gate Charge (Typ. 23.2 nC)
- Low C_{rss} (Typ. 64 pF)
- · Fast Switching Speed
- · 100% Avalanche Tested
- · Improved dv/dt Capability
- · RoHS Compliant

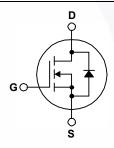
Description

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
- LCD/LED/PDP TV





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

Symbol		Parameter		FDPF320N06L	Unit
V _{DSS}	Drain to Source Voltage			60	V
V _{GSS}	Gate to Source Voltage			±20	V
	Drain Current - Continuous (T _C = 25°C)		21	۸	
ID	Diain Current	- Continuous (T _C = 100°C)		15	A
I _{DM}	Drain Current	- Pulsed	(Note 1)	84	Α
E _{AS}	Single Pulsed Avalanche Energy (Note 2)		(Note 2)	66	mJ
dv/dt	Peak Diode Recovery dv	/dt	(Note 3)	6.0	V/ns
D	$T_{\rm C} = 25^{\circ}{\rm C}$			26	W
P_{D}	Power Dissipation	- Derate Above 25°C		0.17	W/°C
T _J , T _{STG}	Operating and Storage T	emperature Range		-55 to +175	οС
TL	Maximum Lead Tempera	Maximum Lead Temperature for Soldering, 1/8" from Case for 5 Seconds			°C

Thermal Characteristics

Symbol	Parameter FDPF320N06L		Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	5.8	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max. 62.5		*C/VV

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FDPF320N06L	FDPF320N06L	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	$I_D = 250 \mu\text{A}, V_{GS} = 0 \text{V}$	60	-	-	V
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C	-	0.04	-	V/°C
1	Zero Gate Voltage Drain Current	V _{DS} = 48 V, V _{GS} = 0 V	-	-	1	μА
IDSS Zero Gate voltage Drain Current	$V_{DS} = 48 \text{ V}, T_{C} = 150^{\circ}\text{C}$	-	-	500	μΑ	
I _{GSS}	Gate to Body Leakage Current	V _{GS} = ±20 V, V _{DS} = 0 V	-	-	±100	μΑ

On Characteristics

V _{GS(th)}	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_{D} = 250 \mu A$	1.0	-	2.5	V
P	Static Drain to Source On Resistance	V _{GS} = 10 V, I _D = 21 A	-	20	25	mΩ
R _{DS(on)}	NDS(on) Static Drain to Source On Resistance	$V_{GS} = 5 \text{ V}, I_D = 17 \text{ A}$	-	23	38	mΩ
9 _{FS}	Forward Transconductance	V _{DS} = 10 V, I _D = 21 A	-	34	-	S

Dynamic Characteristics

C _{iss}	Input Capacitance	V - 25 V V - 0	V _{DS} = 25 V, V _{GS} = 0 V f = 1 MHz		1105	1470	pF
C _{oss}	Output Capacitance	V _{DS} = 25 V, V _{GS} = 0			115	150	pF
C _{rss}	Reverse Transfer Capacitance	1 - 1 1/11/12			64	-	pF
Q _{g(tot)}	Total Gate Charge at 10V	V _{GS} = 10 V		- \	23.2	30.2	nC
Q _{g(tot)}	Total Gate Charge at 5V	V _{GS} = 5 V		-	12.7	16.5	nC
Q_{gs}	Gate to Source Gate Charge	V _{DS} = 48 V,	(Note 4)	-	3.4	-	nC
Q_{gd}	Gate to Drain "Miller" Charge	I _D = 21 A	(1010-1)	-	6.3	-	nC

Switching Characteristics

t _{d(on)}	Turn-On Delay Time		-	16	42	ns
t _r	Turn-On Rise Time	$V_{DD} = 30 \text{ V}, I_{D} = 21 \text{ A},$	-	34	78	ns
t _{d(off)}	Turn-Off Delay Time	V_{GS} = 5 V, R_G = 4.7 Ω	-	27	64	ns
t _f	Turn-Off Fall Time	(Note 4)	-	8	26	ns
ESR	Equivalent Series Resistance (G-S)	f = 1MHz	-	2	-	Ω

Drain-Source Diode Characteristics

I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	21	Α
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	84	Α
V_{SD}	Drain to Source Diode Forward Voltage V _{GS} = 0 V, I _{SD} = 21 A		-	-	1.3	V
t _{rr}	Reverse Recovery Time V	V _{GS} = 0 V, I _{SD} = 21 A,V _{DD} = 48 V,	-	27	-	ns
Q _{rr}	Reverse Recovery Charge dI _F /dt = 100 A/μs		-	23	-	nC

- **Notes:**1. Repetitive rating: pulse-width limited by maximum junction temperature.
- 2. L = 1 mH, I $_{AS}$ = 11.5 A, R $_{G}$ = 25 Ω , starting T $_{J}$ = 25°C.
- 3. $I_{SD} \le$ 21 A, di/dt \le 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

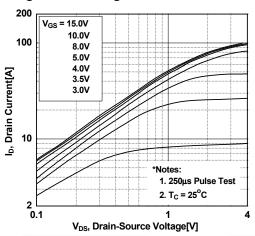


Figure 3. On-Resistance Variation vs.

Drain Current and Gate Voltage

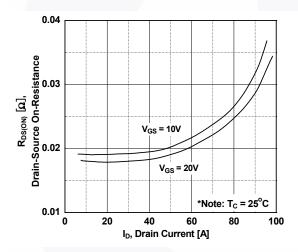


Figure 5. Capacitance Characteristics

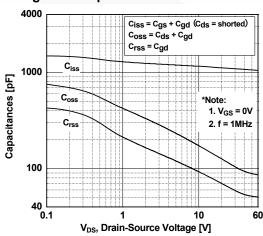


Figure 2. Transfer Characteristics

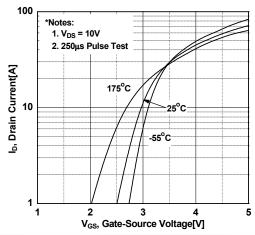


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

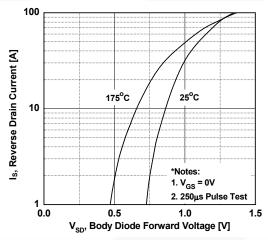
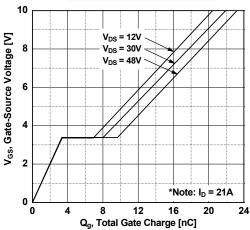


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

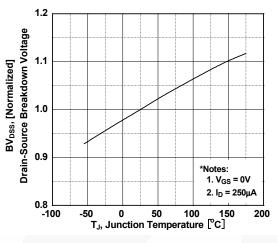


Figure 8. On-Resistance Variation vs. Temperature

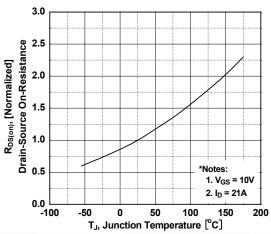


Figure 10. Maximum Drain Current vs. Case Temperature

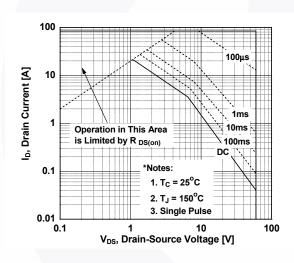


Figure 9. Maximum Safe Operating Area

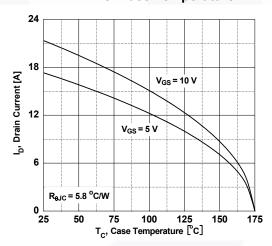
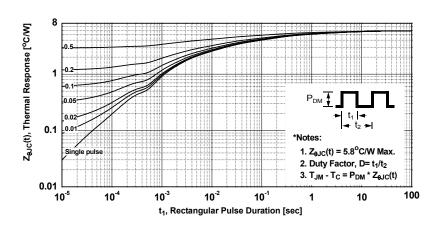


Figure 11. Transient Thermal Response Curve



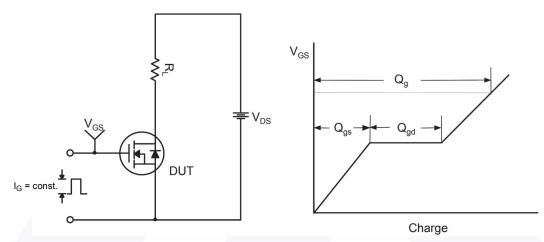


Figure 12. Gate Charge Test Circuit & Waveform

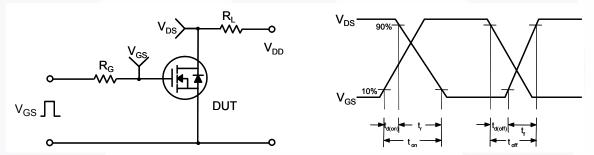


Figure 13. Resistive Switching Test Circuit & Waveforms

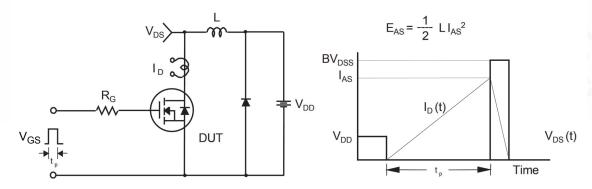


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

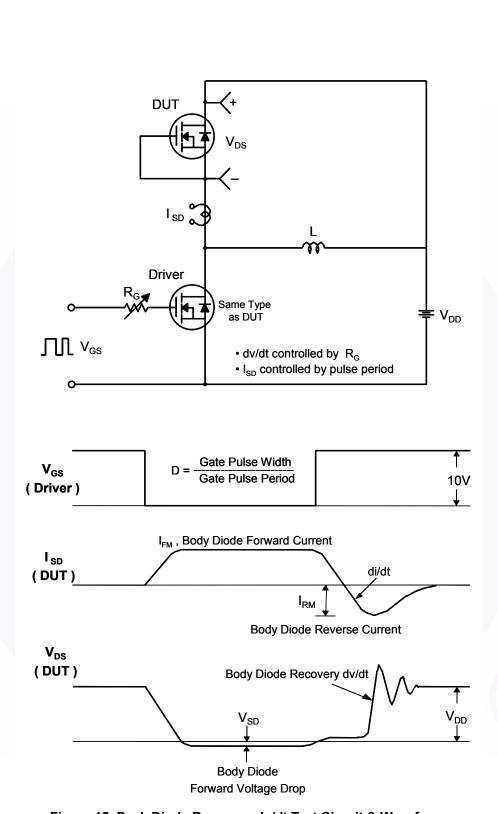


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

Mechanical Dimensions

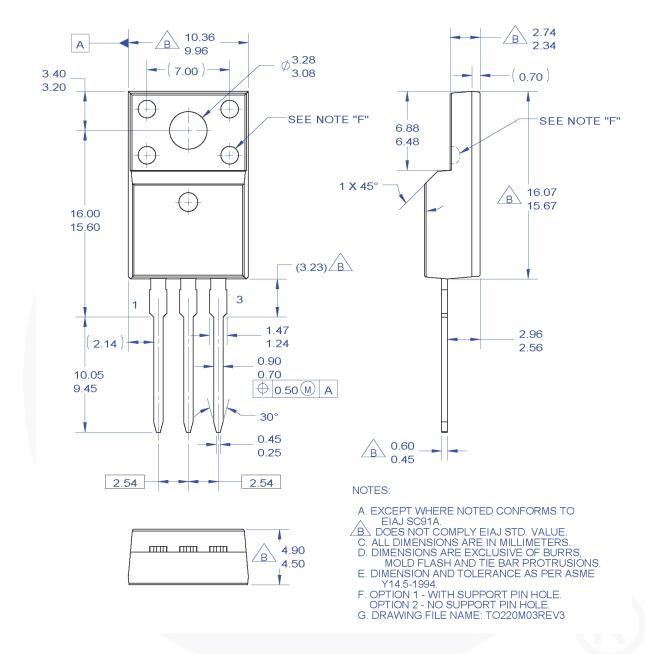


Figure 16. TO220, Molded, 3-Lead, Full Pack, EIAJ SC91, Straight Lead

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Офис по работе с юридическими лицами:

105318, г. Москва, ул. Щербаковская д. 3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

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moschip.ru moschip.ru_6 moschip.ru_4 moschip.ru_9