

November 2013

FDPF14N30

N-Channel UniFETTM MOSFET 300 V, 14 A, 290 m Ω

Features

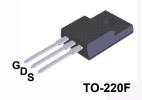
- $R_{DS(on)}$ = 290 m Ω (Max.) @ V_{GS} = 10 V, I_D = 7 A
- Low Gate Charge (Typ. 18 nC)
- Low C_{rss} (Typ. 17 pF)
- 100% Avalanche Tested
- · Improved dv/dt Capability

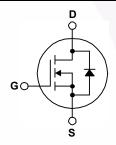
Applications

- PDP TV
- · Uninterruptible Power Supply

Description

UniFETTM MOSFET is Fairchild Semiconductor's high voltage MOSFET family based on planar stripe and DMOS technology. This MOSFET is tailored to reduce on-state resistance, and to provide better switching performance and higher avalanche energy strength. This device family is suitable for switching power converter applications such as power factor correction (PFC), flat panel display (FPD) TV power, ATX and electronic lamp ballasts.





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

Symbol		Parameter	FDPF14N30	Unit
V _{DSS}	Drain-Source Voltage		300	V
I _D	Drain Current	- Continuous (T _C = 25°C) - Continuous (T _C = 100°C)	14 * 8.4 *	A A
I _{DM}	Drain Current	- Pulsed (Note 1)	56 *	Α
V_{GSS}	Gate-Source voltage		±30	V
E _{AS}	Single Pulsed Avalanche Energy (Note 2)		330	mJ
I _{AR}	Avalanche Current (Note 1)		14	Α
E _{AR}	Repetitive Avalanche Energy (Note 1)		14	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)		4.5	V/ns
P_{D}	Power Dissipation (T _C = 25°C) - Derate above 25°C		35 0.28	W/°C
T _J , T _{STG}	Operating and Storage 1	Temperature Range	-55 to +150	°C
T _L	Maximum Lead Tempera	ature for Soldering, 1/8" from Case for 5 Seconds	300	°C

^{*}Drain current limited by maximum junction temperature.

Thermal Characteristics

Symbol	Parameter	FDPF14N30	Unit	
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Max.	3.56	°C/W	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Max.	62.5	G/VV	

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FDPF14N30	FDPF14N30	TO-220F	Tube	N/A	N/A	50 units

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

Symbol	Parameter	Conditions	Min.	Тур.	Max.	Unit
Off Charac	teristics					
BV _{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$	300			V
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	I _D = 250 μA, Referenced to 25°C		0.3		V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 300 V, V _{GS} = 0 V V _{DS} = 240 V, T _C = 125°C			1 10	μA μA
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{GS} = 30 V, V _{DS} = 0 V	-		100	nA
I _{GSSR}	Gate-Body Leakage Current, Reverse	V _{GS} = -30 V, V _{DS} = 0 V			-100	nA
On Charac	teristics					
V _{GS(th)}	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$	3.0		5.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 10 V, I _D = 7 A		0.24	0.29	Ω
9 _{FS}	Forward Transconductance	V _{DS} = 40 V, I _D = 7 A		10.5		S
Dynamic C	Characteristics					
C _{iss}	Input Capacitance	V _{DS} = 25 V, V _{GS} = 0 V,		815	1060	pF
C _{oss}	Output Capacitance	f = 1.0 MHz		150	195	pF
C _{rss}	Reverse Transfer Capacitance			17	25	pF
Switching	Characteristics					
t _{d(on)}	Turn-On Delay Time	V _{DD} = 150 V, I _D = 14 A,		20	50	ns
t _r	Turn-On Rise Time	V_{GS} = 10 V, R_{G} = 25 Ω		105	120	ns
t _{d(off)}	Turn-Off Delay Time			30	70	ns
t _f	Turn-Off Fall Time	(Note 4)		75	160	ns
Qg	Total Gate Charge	$V_{DS} = 240 \text{ V}, I_{D} = 14 \text{ A},$	/	18	25	nC
Q _{gs}	Gate-Source Charge	V _{GS} = 10 V		4.5		nC
Q _{gd}	Gate-Drain Charge	(Note 4)		8		nC
Drain-Sou	rce Diode Characteristics and Maximur	n Ratings				
I _S	Maximum Continuous Drain-Source Diode Forward Current				14	Α
I _{SM}	Maximum Pulsed Drain-Source Diode F	orward Current			56	Α
V_{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = 14 A			1.4	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _S = 14 A,		235		ns
Q _{rr}	Reverse Recovery Charge	dI _F /dt =100 A/μs		1.6		μС

Notes:

^{1.} Repetitive rating: pulse-width limited by maximum junction temperature.

^{2.} L = 2.8 mH, I $_{AS}$ = 14 A, V $_{DD}$ = 50 V, R $_{G}$ = 25 $\Omega,$ starting T $_{J}$ = 25 $^{\circ}C.$

^{3.} I $_{SD}$ \leq 14 A, di/dt \leq 200 A/µs, V $_{DD}$ \leq BV $_{DSS}$, starting T $_{J}$ = 25°C.

^{4.} Essentially independent of operating temperature typical characteristics.

Typical Performance Characteristics

Figure 1. On-Region Characteristics

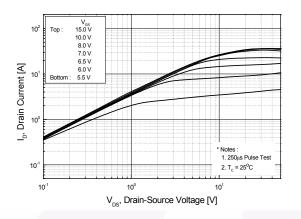


Figure 2. Transfer Characteristics

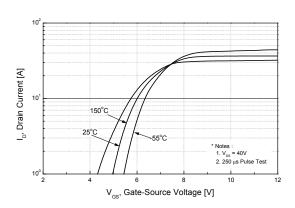
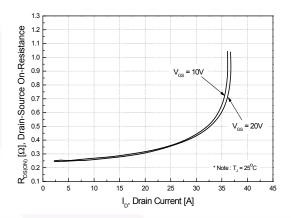


Figure 3. On-Resistance Variation vs.
Drain Current and Gate Voltage

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



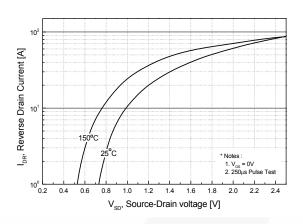


Figure 5. Capacitance Characteristics

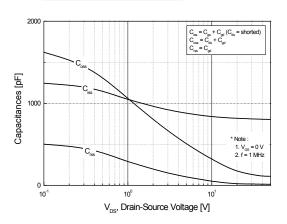
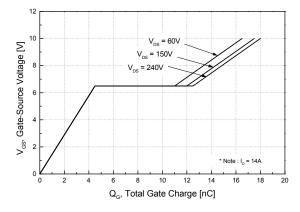


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

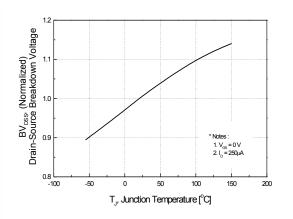


Figure 8. On-Resistance Variation vs. Temperature

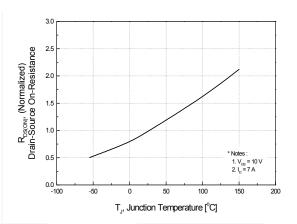


Figure 9. Maximum Safe Operating Area

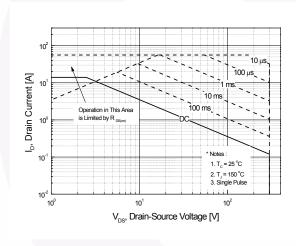


Figure 10. Maximum Drain Current vs. Case Temperature

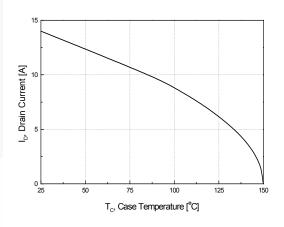
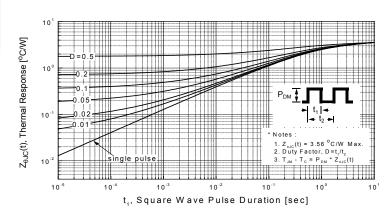


Figure 11. Transient Thermal Response Curve



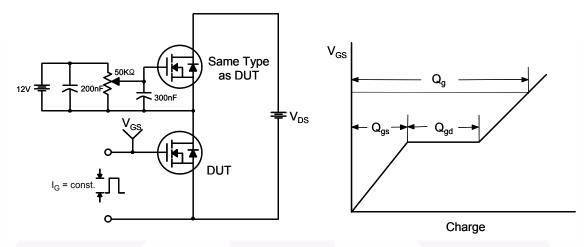


Figure 12. Gate Charge Test Circuit & Waveform

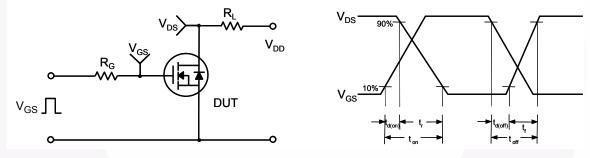


Figure 13. Resistive Switching Test Circuit & Waveforms

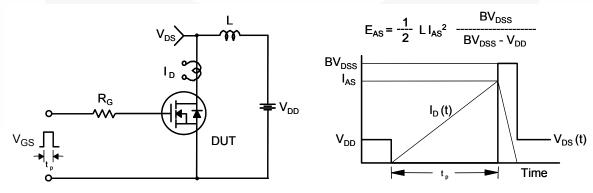


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

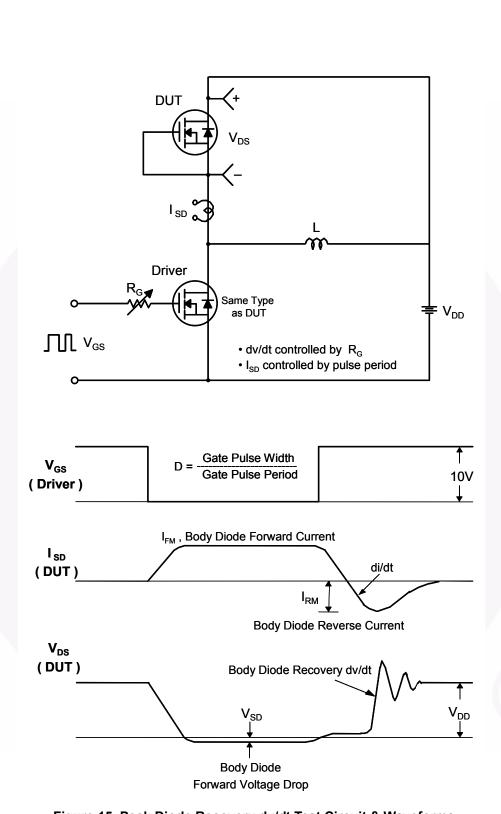


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

Mechanical Dimensions

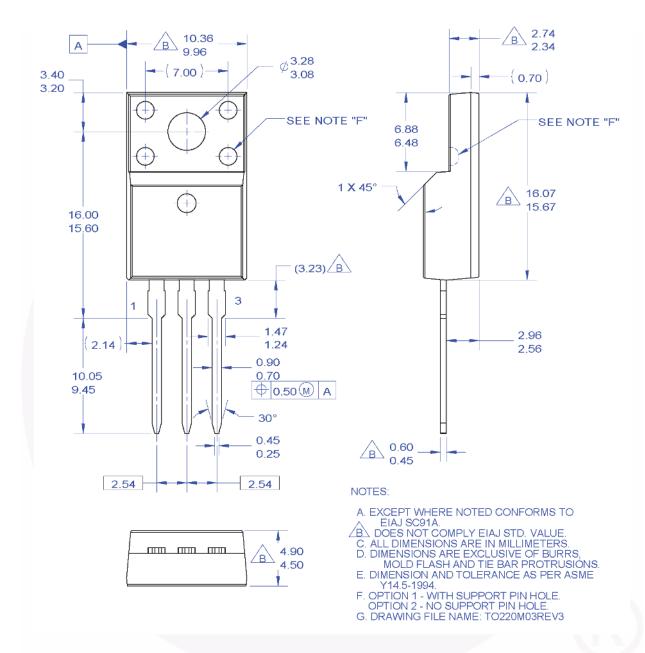


Figure 16. TO220, Molded, 3-Lead, Full Pack, EIAJ SC91, Straight Lead

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