

November 2013

### **FDPF14N30**

# N-Channel UniFET<sup>TM</sup> MOSFET 300 V, 14 A, 290 m $\Omega$

#### **Features**

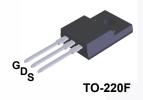
- $R_{DS(on)}$  = 290 m $\Omega$  (Max.) @  $V_{GS}$  = 10 V,  $I_D$  = 7 A
- Low Gate Charge (Typ. 18 nC)
- Low C<sub>rss</sub> (Typ. 17 pF)
- 100% Avalanche Tested
- · Improved dv/dt Capability

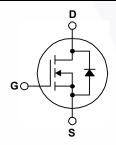
### **Applications**

- PDP TV
- · Uninterruptible Power Supply

### **Description**

UniFET<sup>TM</sup> 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 <sub>DSS</sub>	Drain-Source Voltage		300	V
I <sub>D</sub>	Drain Current	- Continuous (T <sub>C</sub> = 25°C) - Continuous (T <sub>C</sub> = 100°C)	14 * 8.4 *	A A
I <sub>DM</sub>	Drain Current	- Pulsed (Note 1)	56 *	Α
$V_{GSS}$	Gate-Source voltage		±30	V
E <sub>AS</sub>	Single Pulsed Avalanche Energy (Note 2)		330	mJ
I <sub>AR</sub>	Avalanche Current (Note 1)		14	Α
E <sub>AR</sub>	Repetitive Avalanche Energy (Note 1)		14	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)		4.5	V/ns
P <sub>D</sub>	Power Dissipation	(T <sub>C</sub> = 25°C) - Derate above 25°C	35 0.28	W W/°C
T <sub>J,</sub> T <sub>STG</sub>	Operating and Storage	Temperature Range	-55 to +150	°C
T <sub>L</sub>	Maximum Lead Temper	ature for Soldering, 1/8" from Case for 5 Seconds	300	°C

<sup>\*</sup>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/ <b>VV</b>

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

#### Notes:

<sup>1.</sup> Repetitive rating: pulse-width limited by maximum junction temperature.

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

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

<sup>4.</sup> Essentially independent of operating temperature typical characteristics.

### **Typical Performance Characteristics**

Figure 1. On-Region Characteristics

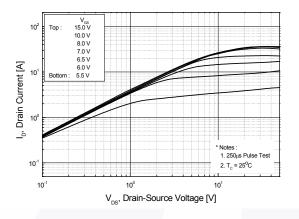


Figure 2. Transfer Characteristics

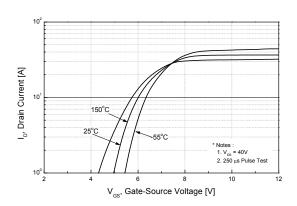
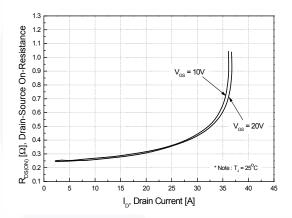


Figure 3. On-Resistance Variation vs.
Drain Current and Gate Voltage

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



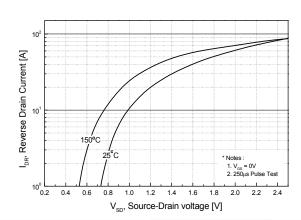


Figure 5. Capacitance Characteristics

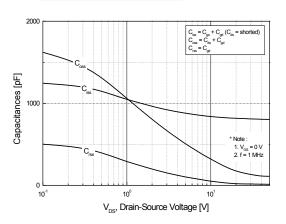
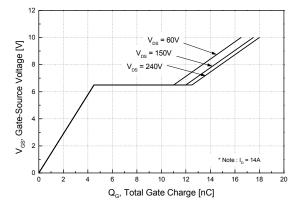


Figure 6. Gate Charge Characteristics



### **Typical Performance Characteristics** (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

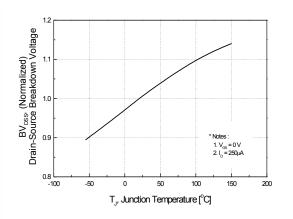


Figure 8. On-Resistance Variation vs. Temperature

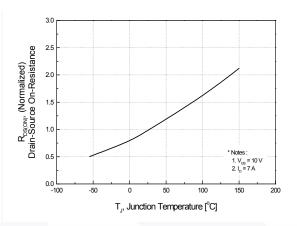


Figure 9. Maximum Safe Operating Area

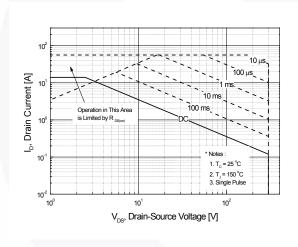
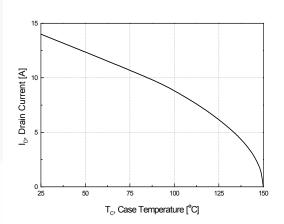
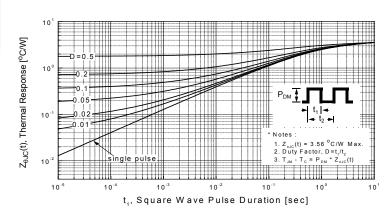


Figure 10. Maximum Drain Current vs. Case Temperature



**Figure 11. Transient Thermal Response Curve** 



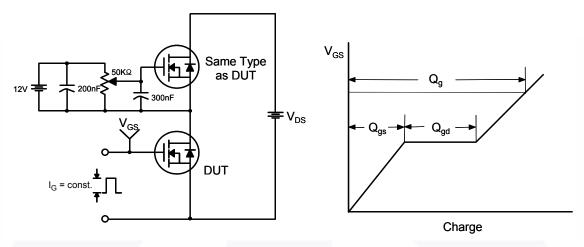


Figure 12. Gate Charge Test Circuit & Waveform

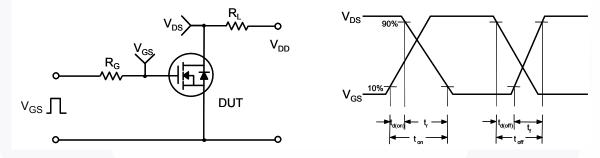


Figure 13. Resistive Switching Test Circuit & Waveforms

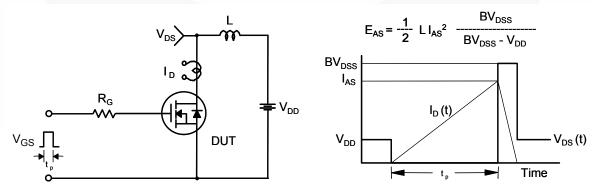


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

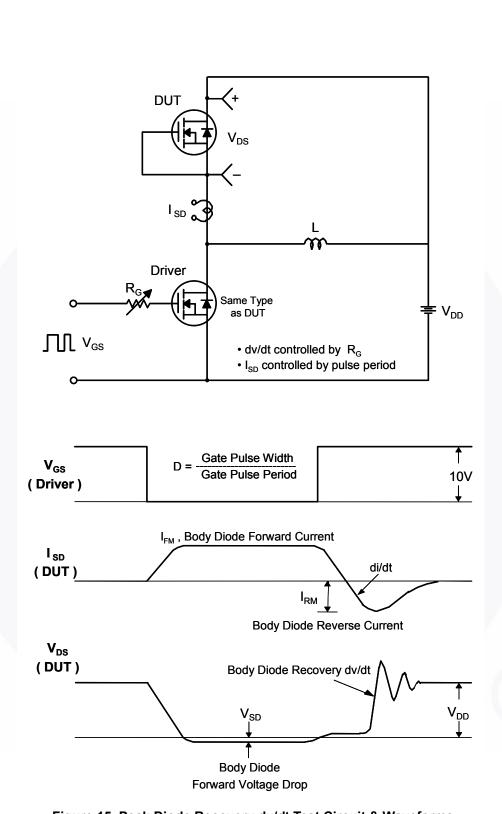


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

#### **Mechanical Dimensions**

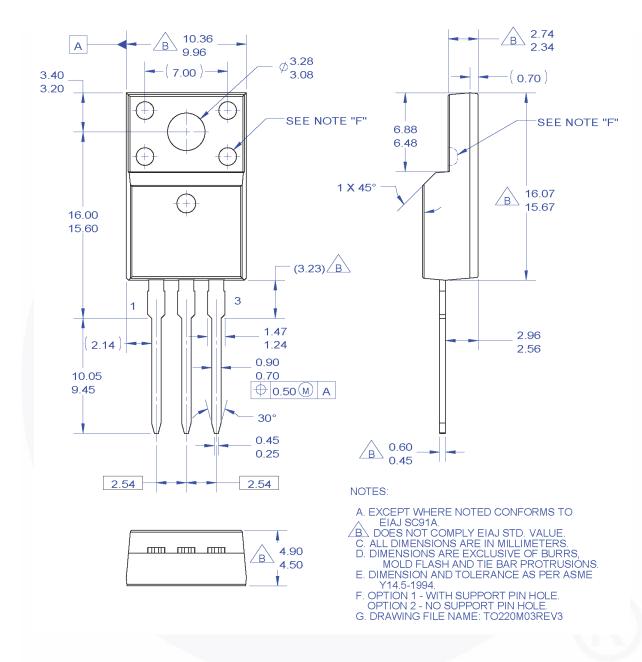


Figure 16. TO220, Molded, 3-Lead, Full Pack, EIAJ SC91, Straight Lead

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