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August 2014

FDPF44N25T

N-Channel UniFETTM MOSFET 250 V, 44 A, 69 m Ω

Features

- $R_{DS(on)}$ = 69 m Ω (Max.) @ V_{GS} = 10 V, I_D = 22 A
- Low Gate Charge (Typ. 47 nC)
- Low C_{rss} (Typ. 60 pF)

Applications

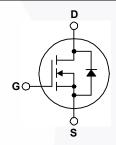
- PDP TV
- · Lighting
- · Uninterruptible Power Supply
- AC-DC Power Supply

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			FDPF44N25T FDPF44N25TRDTU	Unit	
V_{DSS}	Drain-Source Voltage			250	V	
I _D	Drain Current	- Continuous (T _C = 25°C) - Continuous (T _C = 100°C)		44* 26.4*	A A	
I _{DM}	Drain Current	- Pulsed	(Note 1)	176*	Α	
V_{GSS}	Gate-Source voltage			± 30	V	
E _{AS}	Single Pulsed Avalanche Energy		(Note 2)	2055	mJ	
I _{AR}	Avalanche Current		(Note 1)	44	Α	
E _{AR}	Repetitive Avalanche Energy (No		(Note 1)	30.7	mJ	
dv/dt	Peak Diode Recovery dv/d		(Note 3)	4.5	V/ns	
P _D	Power Dissipation	(T _C = 25°C) - Derate Above 25°C		38 0.3	W/°C	
T _J , T _{STG}	Operating and Storage Temperature Range			-55 to +150	°C	
TL	Maximum Lead Temperature for Soldering, 1/8" from Case for 5 Seconds		5 Seconds	300	°C	

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

Thermal Characteristics

Symbol	Parameter	FDPF44N25T FDPF44N25TRDTU	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	C/VV

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FDPF44N25T	FDPF44N25T	TO-220F	Tube	N/A	N/A	50 units
FDPF44N25TRDTU	FDPF44N25T	TO-220F (LG-formed)	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 V, I_{D} = 250 μ A, T_{J} = 25°C	250			V
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	I _D = 250 μA, Referenced to 25°C		0.25		V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 250 V, V _{GS} = 0 V V _{DS} = 200 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 = 22 A		0.058	0.069	Ω
9 _{FS}	Forward Transconductance	V _{DS} = 40 V, I _D = 22 A		32		S
Dynamic C	Characteristics				•	
C _{iss}	Input Capacitance	V _{DS} = 25 V, V _{GS} = 0 V,		2210	2870	pF
C _{oss}	Output Capacitance	f = 1.0 MHz		450	585	pF
C _{rss}	Reverse Transfer Capacitance			60	90	pF
Switching	Characteristics					
t _{d(on)}	Turn-On Delay Time	$V_{DD} = 125 \text{ V}, I_{D} = 44 \text{ A},$		53	117	ns
t _r	Turn-On Rise Time	$R_G = 25 \Omega$		402	814	ns
t _{d(off)}	Turn-Off Delay Time			85	179	ns
t _f	Turn-Off Fall Time	(Note 4)	/	112	234	ns
Qg	Total Gate Charge	$V_{DS} = 200 \text{ V}, I_{D} = 44 \text{ A},$		47	61	nC
Q_{gs}	Gate-Source Charge	V _{GS} = 10 V		18		nC
Q _{gd}	Gate-Drain Charge	(Note 4)		24		nC
Drain-Soul	rce Diode Characteristics and Maximun	n Ratings				
I _S	Maximum Continuous Drain-Source Diode Forward Current				44	Α
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current				176	Α
V_{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = 44 A			1.4	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _S = 44 A,		195		ns
Q _{rr}	Reverse Recovery Charge	dl _F /dt =100 A/μs		1.8	/	μС

Notes

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

^{2.} L = 1.7 mH, I $_{AS}$ = 44 A, V $_{DD}$ = 50 V, R $_{G}$ = 25 $\Omega,$ starting T $_{J}$ = 25°C.

^{3.} I_{SD} \leq 44 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

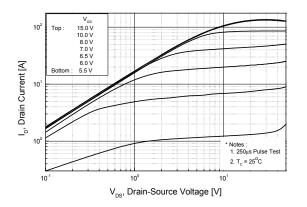


Figure 3. On-Resistance Variation vs.

Drain Current and Gate Voltage

Figure 2. Transfer Characteristics

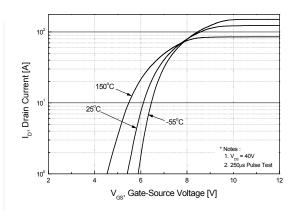
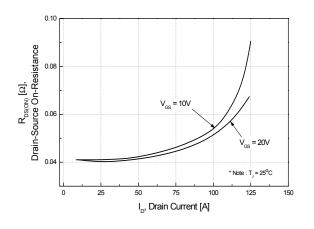


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperatue



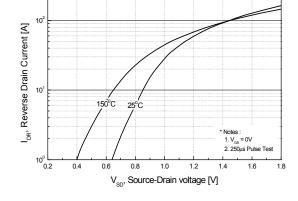


Figure 5. Capacitance Characteristics

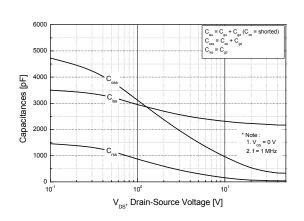
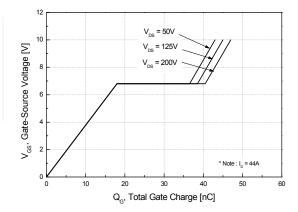


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

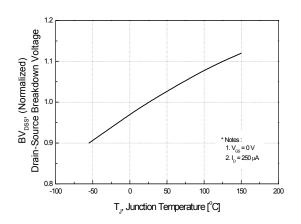


Figure 9. Maximum Safe Operating Area

Figure 8. On-Resistance Variation vs. Temperature

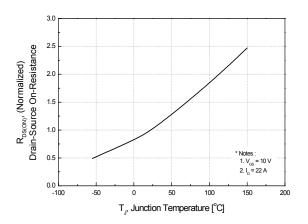
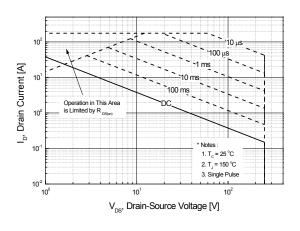


Figure 10. Maximum Drain Current vs. Case Temperature



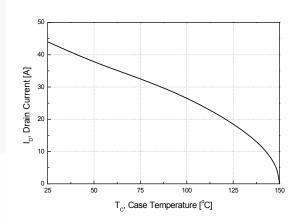
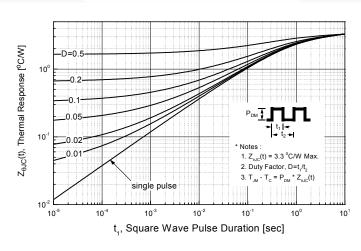


Figure 11. Transient Thermal Response Curve



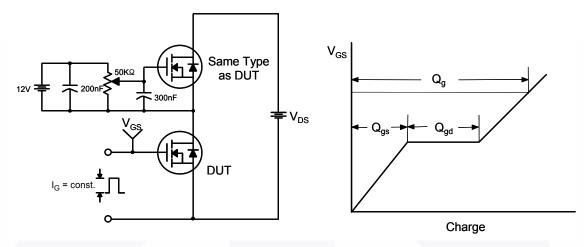


Figure 12. Gate Charge Test Circuit & Waveform

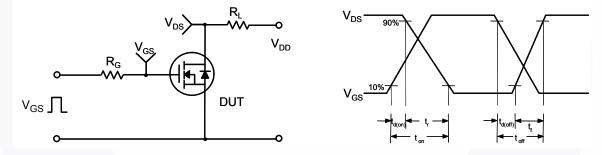


Figure 13. Resistive Switching Test Circuit & Waveforms

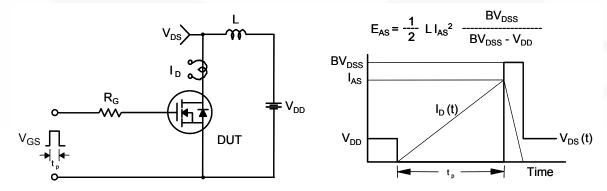


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

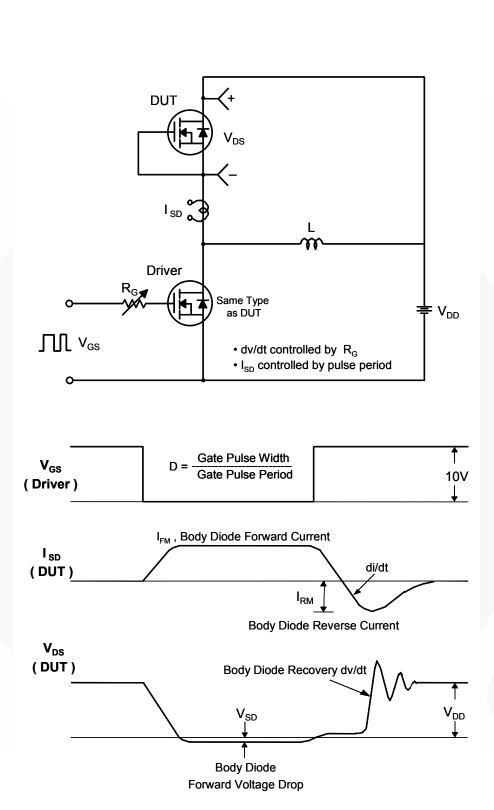
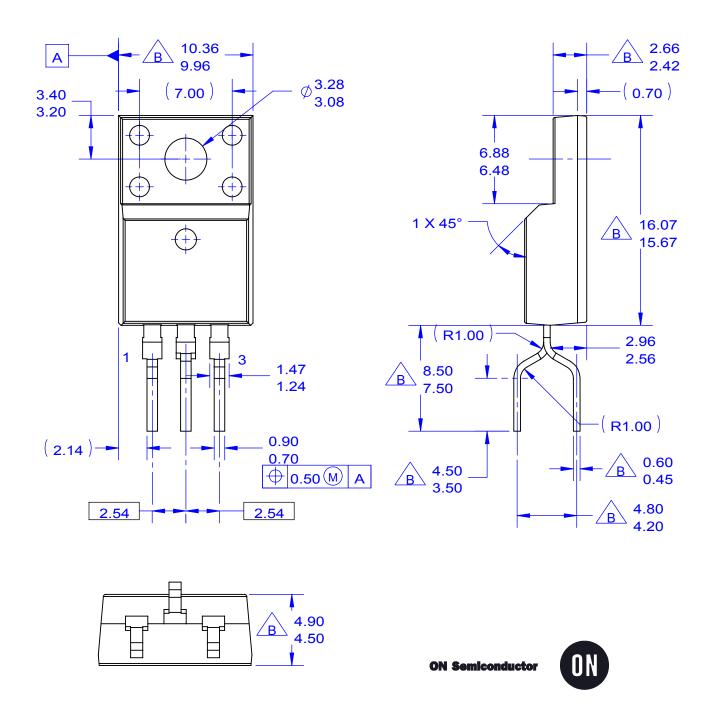


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

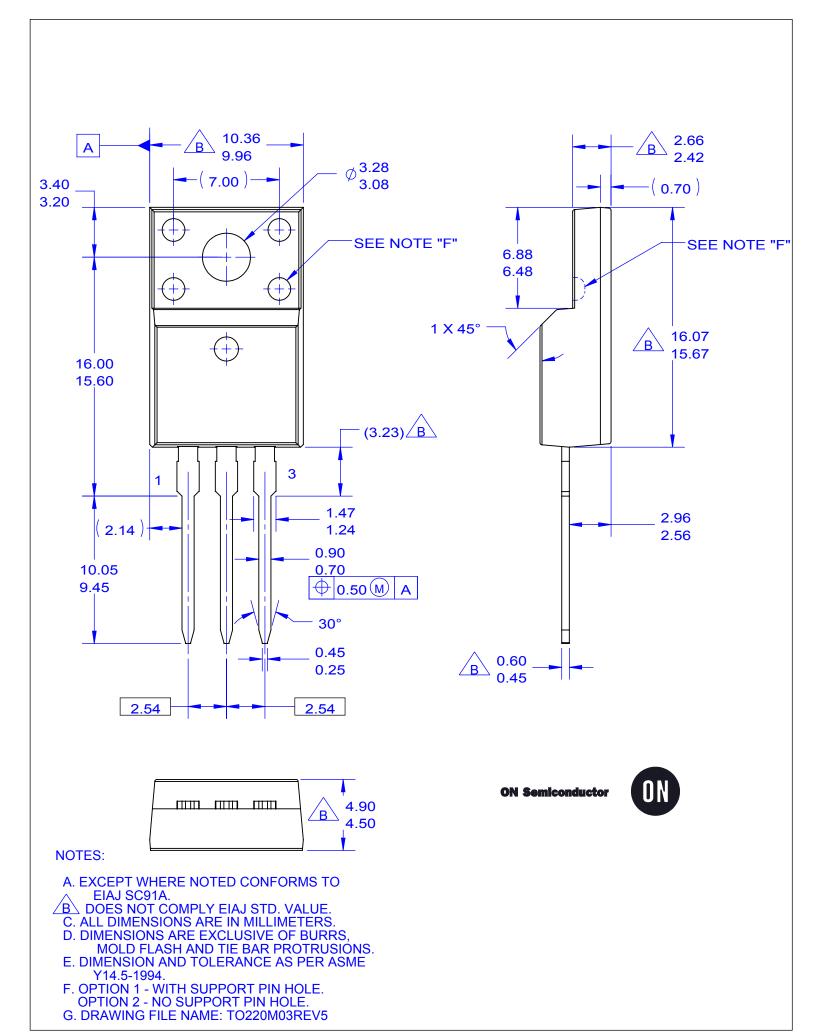


NOTES:

- A. EXCEPT WHERE NOTED CONFORMS TO EIAJ SC91A.

 B DOES NOT COMPLY EIAJ STD. VALUE.
 C. ALL DIMENSIONS ARE IN MILLIMETERS.

- D. DIMENSIONS ARE EXCLUSIVE OF BURRS MOLD FLASH AND TIE BAR PROTRUSIÓNS.
- E. DIMENSION AND TOLERANCE AS PER ASME Y14.5-1994.
- F. DRAWING FILE NAME: TO220N03REV2



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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

Skype отдела продаж:

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