

March 2013

FDB44N25

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

Features

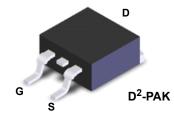
- $R_{DS(on)} = 69 \text{ m}\Omega \text{ (Max.)} @ V_{GS} = 10 \text{ V, } I_D = 22 \text{ A}$
- Low Gate Charge (Typ. 47 nC)
- Low C_{rss} (Typ. 60 pF)
- 100% Avalanche Tested

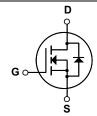
Applications

- 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

Symbol	Parameter			FDB44N25	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	А
V _{GSS}	Gate-Source voltage			±30	V
E _{AS}	Single Pulsed Avalanche Energy		(Note 2)	2055	mJ
I _{AR}	Avalanche Current		(Note 1)	44	А
E _{AR}	Repetitive Avalanche Energy		(Note 1)	30.7	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		307 2.45	W W/°C
T _{J,} T _{STG}	Operating and Storage Temperature Range			-55 to +150	°C
T _L	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds		se,	300	°C

Thermal Characteristics

Symbol	Parameter	FDB44N25	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Max. 0.41		
R _{0JA} *	Thermal Resistance, Junction-to-Ambient* 40 °C/M		°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Max. 62.5		

^{*} When mounted on the minimum pad size recommended (PCB Mount)

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDB44N25	FDB44N25TM	D2-PAK	330mm	24mm	800

$\textbf{Electrical Characteristics} \quad \textbf{T}_{\text{C}} = 25^{\circ}\text{C unless otherwise noted}$

Symbol	Parameter	Conditions	Min.	Тур.	Max	Unit
Off Charac	teristics			·		•
BV _{DSS}	Drain-Source Breakdown Voltage $V_{GS} = 0V$, $I_D = 250\mu A$		250			V
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	I _D = 250μA, Referenced to 25°C		0.25		V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 250V, V _{GS} = 0V V _{DS} = 200V, T _C = 125°C			1 10	μ Α μ Α
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{GS} = 30V, V _{DS} = 0V			100	nA
I _{GSSR}	Gate-Body Leakage Current, Reverse	V _{GS} = -30V, V _{DS} = 0V			-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} = 10V, I _D = 22A		0.058	0.069	Ω
9 _{FS}	Forward Transconductance	V _{DS} = 40V, I _D = 22A		32		S
Dynamic C	Characteristics					
C _{iss}	Input Capacitance	V _{DS} = 25V, V _{GS} = 0V,		2210	2870	pF
C _{oss}	Output Capacitance	f = 1.0MHz		450	585	pF
C _{rss}	Reverse Transfer Capacitance			60	90	pF
Switching	Characteristics					
t _{d(on)}	Turn-On Delay Time	,		55	120	ns
t _r	Turn-On Rise Time	$R_G = 25\Omega$		400	810	ns
t _{d(off)}	Turn-Off Delay Time			85	180	ns
t _f	Turn-Off Fall Time	(Note 4)		115	240	ns
Qg	Total Gate Charge	V _{DS} = 200V, I _D = 44A		47	61	nC
Q_{gs}	Gate-Source Charge	V _{GS} = 10V		18		nC
Q_{gd}	Gate-Drain Charge (Note 4)			24		nC
Drain-Sour	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} = 0V, I _S = 44A			1.4	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0V, I _S = 44A		195		ns
Q _{rr}	Reverse Recovery Charge	dl _F /dt =100A/μs		1.8		μС

NOTES

- ${\bf 1.}\ {\bf Repetitive}\ {\bf Rating:}\ {\bf Pulse}\ {\bf width}\ {\bf limited}\ {\bf by}\ {\bf maximum}\ {\bf junction}\ {\bf temperature}$
- 2. L = 1.7mH, I_{AS} = 44A, V_{DD} = 50V, R_G = 25 Ω , Starting T_J = 25°C
- 3. $I_{SD} \le 44A$, di/dt $\le 200A/\mu s$, $V_{DD} \le BV_{DSS}$, Starting T_J = 25°C
- 4. Essentially Independent of Operating Temperature Typical Characteristics

Typical Performance Characteristics

Figure 1. On-Region Characteristics

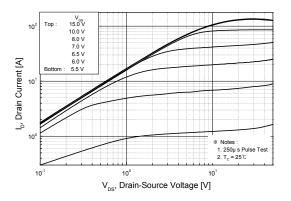


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

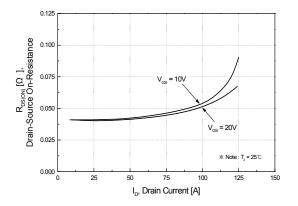


Figure 5. Capacitance Characteristics

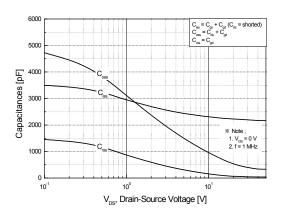


Figure 2. Transfer Characteristics

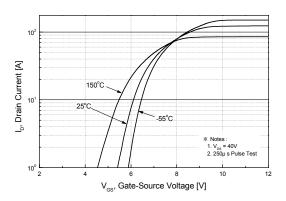


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperatue

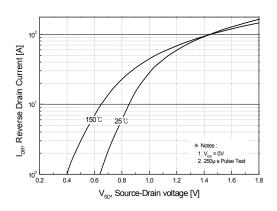
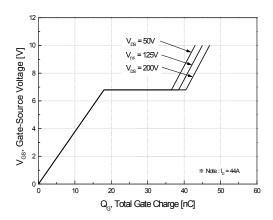


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

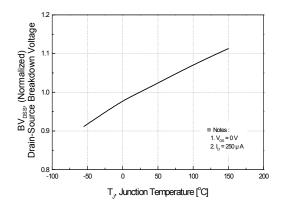


Figure 8. On-Resistance Variation vs. Temperature

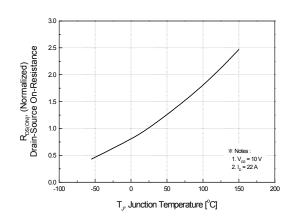
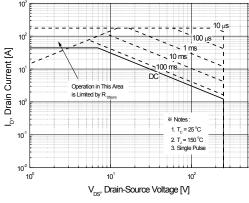


Figure 9. Maximum Safe Operating Area





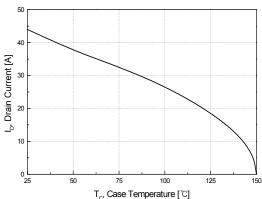
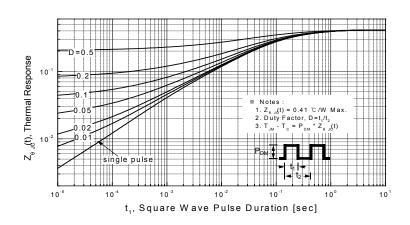
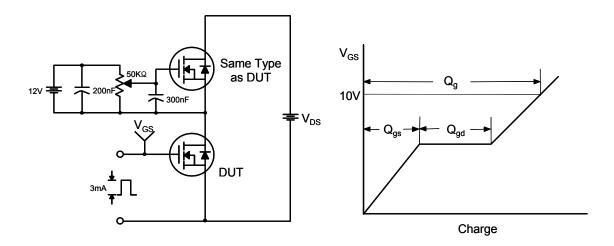


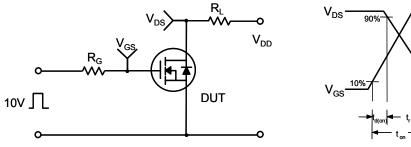
Figure 11. Transient Thermal Response Curve

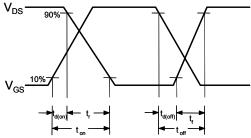


Gate Charge Test Circuit & Waveform

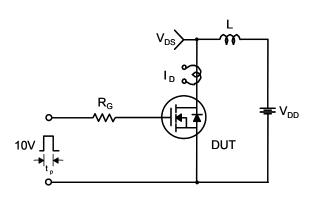


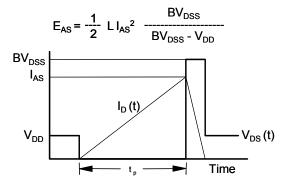
Resistive Switching Test Circuit & Waveforms



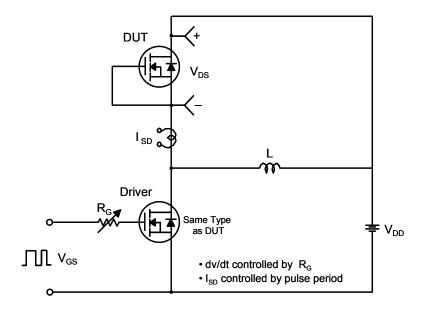


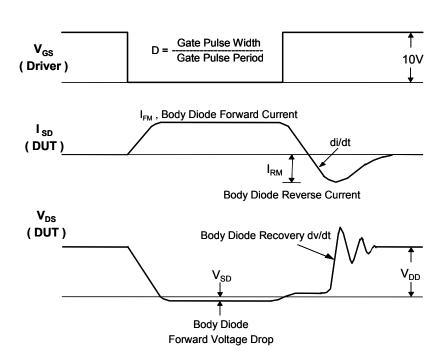
Unclamped Inductive Switching Test Circuit & Waveforms





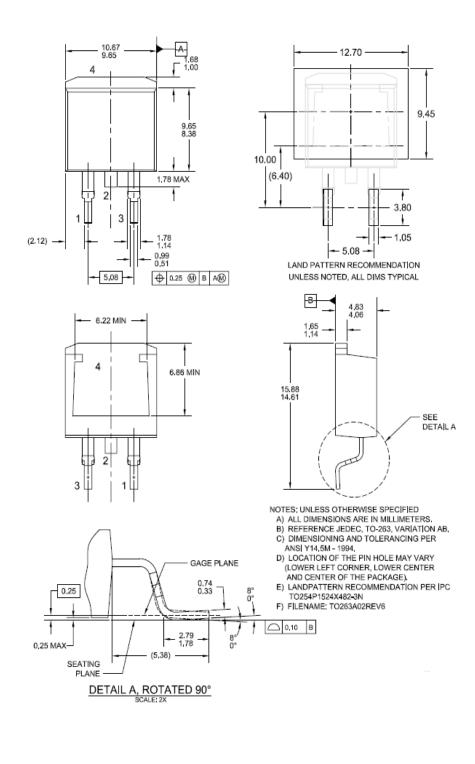
Peak Diode Recovery dv/dt Test Circuit & Waveforms





Mechanical Dimensions

D²PAK







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