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November 2013

FDB031N08

N-Channel PowerTrench[®] MOSFET 75 V, 235 A, 3.1 m Ω

Features

- $R_{DS(on)}$ = 2.4 m Ω (Typ.) @ V_{GS} = 10 V, I_D = 75 A
- · Fast Switching Speed
- · Low Gate Charge
- High Performance Trench Technology for Extremely Low $R_{DS(on)}$
- · High Power and Current Handling Capability
- RoHS Compliant

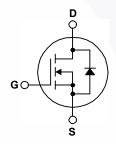
Description

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

- · Synchronous Rectification for ATX / Server / Telecom PSU
- · Battery Protection Circuit
- · Motor Drives and Uninterruptible Power Supplies





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

Symbol		Parameter		FDB031N08	Unit
V _{DSS}	Drain to Source Voltage			75	V
V _{GSS}	Gate to Source Voltage		±20	V	
	Drain Current -	ed)	235	Α	
I _D	-	ed)	165	Α	
	-	nited)	120	Α	
I _{DM}	Drain Current	- Pulsed	- Pulsed (Note 1)		
E _{AS}	Single Pulsed Avalanche Er	nergy	(Note 2)	1995	mJ
dv/dt	Peak Diode Recovery dv/dt		(Note 3)	5.5	V/ns
D	Dower Dissinction	(T _C = 25°C)		375	W
P_{D}	Power Dissipation	- Derate Above 25°C		2.5	W/°C
T _J , T _{STG}	Operating and Storage Temperature Range			-55 to +175	°C
TL	Maximum Lead Temperatur	e for Soldering, 1/8" from Case for 5 Se	econds	300	°C

Thermal Characteristics

Symbol	Parameter	FDB031N08	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.4	°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
FDB031N08	FDB031N08	D ² -PAK	Tape and Reel	330 mm	24 mm	800 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	$I_D = 250 \mu A, V_{GS} = 0 V, T_C = 25^{\circ}C$	75	-	-	V
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C	-	0.05	-	V/°C
1	Zero Gate Voltage Drain Current	$V_{DS} = 75 \text{ V}, V_{GS} = 0 \text{ V}$	-	-	1	μA
IDSS	Zero Gate Voltage Drain Current	$V_{DS} = 75 \text{ V}, T_{C} = 150^{\circ}\text{C}$	-	-	500	μΑ
I _{GSS}	Gate to Body Leakage Current	V _{GS} = ±20 V, V _{DS} = 0 V	-	-	±100	nA

On Characteristics

V _{GS(th)}	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_{D} = 250 \mu\text{A}$	2.5	3.5	4.5	V
R _{DS(on)}	Static Drain to Source On Resistance	V _{GS} = 10 V, I _D = 75 A	1	2.4	3.1	$m\Omega$
g _{FS}	Forward Transconductance	V _{DS} = 10 V, I _D = 75 A	-	180	-	S

Dynamic Characteristics

C _{iss}	Input Capacitance	V 05.V.V 0.V		-	11400	15160	pF
C _{oss}	Output Capacitance	$V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V},$ f = 1 MHz		-	1360	1810	pF
C _{rss}	Reverse Transfer Capacitance	1 – 1 101112		-\	595	800	pF
Q _{g(tot)}	Total Gate Charge at 10V	V _{DS} = 60 V, I _D = 75 A,		-	169	220	nC
Q_{gs}	Gate to Source Gate Charge	V _{GS} = 10 V		-	60	-	nC
Q_{gd}	Gate to Drain "Miller" Charge	(Note	4)	-	47	-	nC

Switching Characteristics

	9					
t _{d(on)}	Turn-On Delay Time		-	230	470	ns
t _r	Turn-On Rise Time	$V_{DD} = 37.5 \text{ V}, I_D = 75 \text{ A},$	-	191	392	ns
t _{d(off)}	Turn-Off Delay Time	$R_{G} = 25 \Omega, V_{GS} = 10 V$	-	335	680	ns
t _f	Turn-Off Fall Time	(Note 4	-	121	252	ns

Drain-Source Diode Characteristics

I _S	Maximum Continuous Drain to Source Dioc	Maximum Continuous Drain to Source Diode Forward Current		-	235	Α
I _{SM}	Maximum Pulsed Drain to Source Diode Fo	rward Current	-	-	940	Α
V_{SD}	Drain to Source Diode Forward Voltage	V _{GS} = 0 V, I _{SD} = 75 A	-	-	1.3	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _{SD} = 75 A,	-	53	-	ns
Q _{rr}	Reverse Recovery Charge	$dI_F/dt = 100 A/\mu s$	-	77	-	nC

- 1. Repetitive rating: pulse-width limited by maximum junction temperature.
- 2. L = 0.71 mH, I $_{AS}$ = 75 A, V $_{DD}$ = 50 V, R $_{G}$ = 25 $\Omega,$ starting T $_{J}$ = 25 $^{\circ}C.$
- 3. I $_{SD}$ \leq 75 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

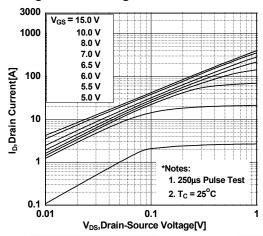


Figure 3. On-Resistance Variation vs.

Drain Current and Gate Voltage

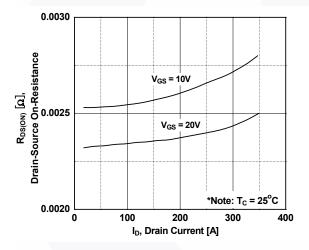


Figure 5. Capacitance Characteristics

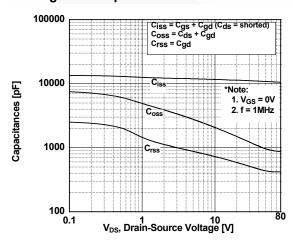


Figure 2. Transfer Characteristics

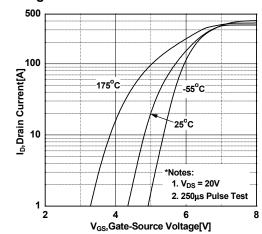


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

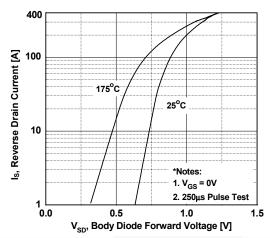
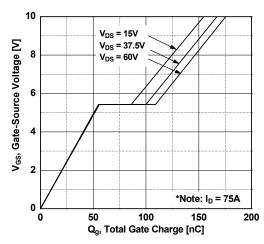


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

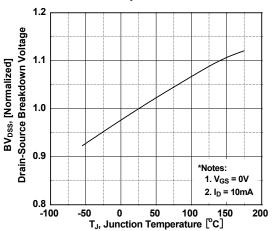


Figure 8. On-Resistance Variation vs. Temperature

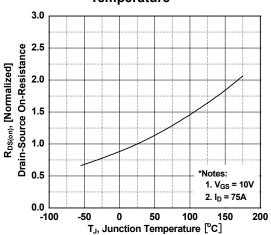


Figure 9. Maximum Safe Operating Area

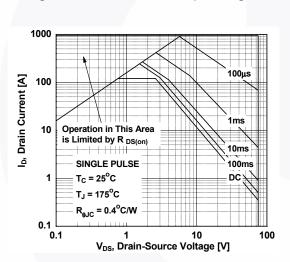


Figure 10. Maximum Drain Current vs. Case Temperature

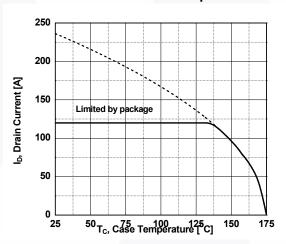
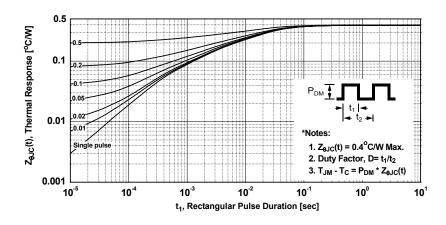


Figure 11. Transient Thermal Response Curve



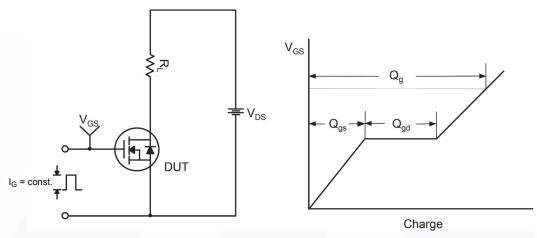


Figure 12. Gate Charge Test Circuit & Waveform

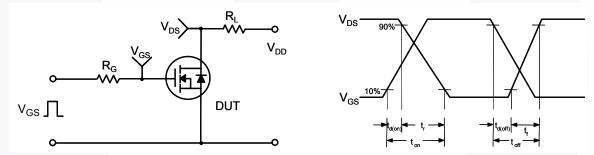


Figure 13. Resistive Switching Test Circuit & Waveforms

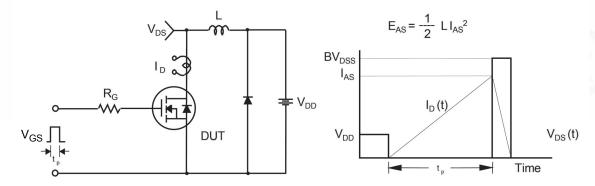


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

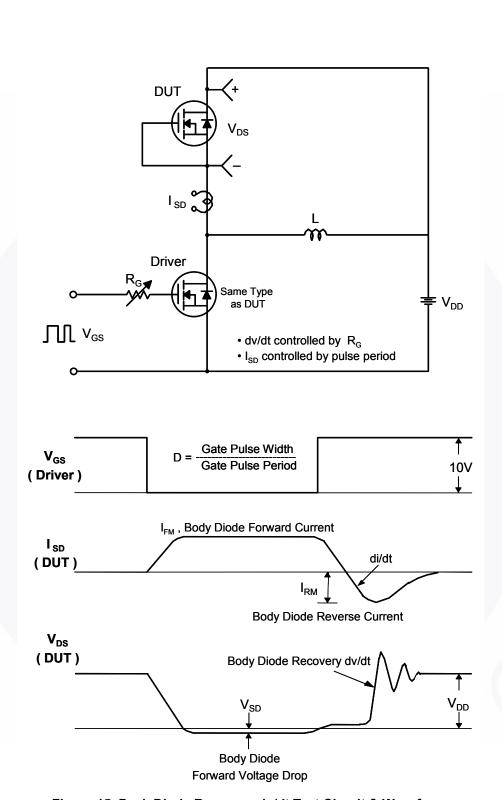


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

Mechanical Dimensions

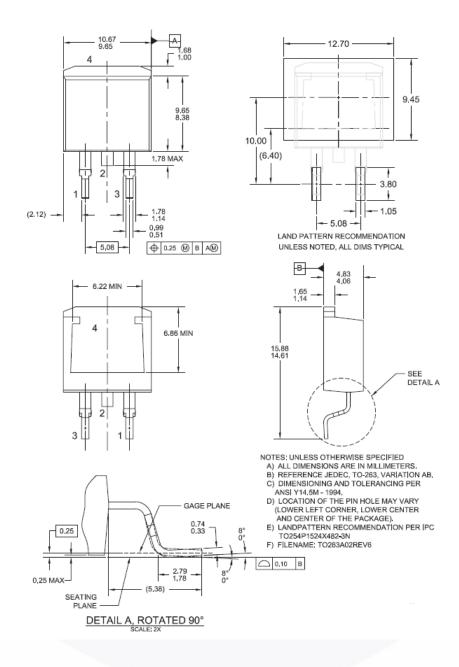


Figure 16. TO263 (D²PAK), Molded, 2-Lead, Surface Mount

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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