



# FDB088N08

## N-Channel PowerTrench® MOSFET

75V, 85A, 8.8mΩ

### Features

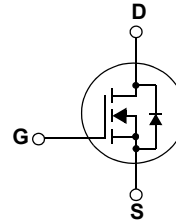
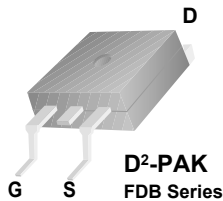
- $R_{DS(on)} = 7.3 \text{ m}\Omega$  (Typ.) @  $V_{GS} = 10\text{V}$ ,  $I_D = 75\text{A}$
- Fast Switching Speed
- Low Gate Charge
- High Performance Trench Technology for Extremely Low  $R_{DS(on)}$
- High Power and Current Handling Capability
- RoHS Compliant

### Description

This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench process that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

### Application

- DC to DC Convertors / Synchronous Rectification



### Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted\*

Symbol	Parameter	FDB088N08	Units
$V_{DSS}$	Drain to Source Voltage	75	V
$V_{GSS}$	Gate to Source Voltage	$\pm 20$	V
$I_D$	Drain Current	- Continuous ( $T_C = 25^\circ\text{C}$ , Silicon Limited)	85*
		- Continuous ( $T_C = 100^\circ\text{C}$ , Silicon Limited)	60
		- Continuous ( $T_C = 25^\circ\text{C}$ , Package Limited)	75
$I_{DM}$	Drain Current - Pulsed (Note 1)	340	A
$E_{AS}$	Single Pulsed Avalanche Energy (Note 2)	309	mJ
$dv/dt$	Peak Diode Recovery $dv/dt$ (Note 3)	6.3	V/ns
$P_D$	Power Dissipation	( $T_C = 25^\circ\text{C}$ )	160
		- Derate above $25^\circ\text{C}$	1.06
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to +175	$^\circ\text{C}$
$T_L$	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds	300	$^\circ\text{C}$

\*Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 75A.

### Thermal Characteristics

Symbol	Parameter	Ratings	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.94	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	62.5	

## Package Marking and Ordering Information $T_C = 25^\circ\text{C}$ unless otherwise noted

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDB088N08	FDB088N08	D2-PAK	330mm	24mm	800

## Electrical Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
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### Off Characteristics

$BV_{DSS}$	Drain to Source Breakdown Voltage	$I_D = 250\mu\text{A}$ , $V_{GS} = 0\text{V}$ , $T_C = 25^\circ\text{C}$	75	-	-	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\mu\text{A}$ , Referenced to $25^\circ\text{C}$	-	0.07	-	$V/^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 75\text{V}$ , $V_{GS} = 0\text{V}$	-	-	1	$\mu\text{A}$
		$V_{DS} = 75\text{V}$ , $T_C = 150^\circ\text{C}$	-	-	500	
$I_{GSS}$	Gate to Body Leakage Current	$V_{GS} = \pm 20\text{V}$ , $V_{DS} = 0\text{V}$	-	-	$\pm 100$	nA

### On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}$ , $I_D = 250\mu\text{A}$	2.0	-	4.0	V
$R_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{V}$ , $I_D = 75\text{A}$	-	7.3	8.8	$\text{m}\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS} = 10\text{V}$ , $I_D = 37.5\text{A}$ (Note 4)	-	300	-	S

### Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = 25\text{V}$ , $V_{GS} = 0\text{V}$ $f = 1\text{MHz}$	-	4960	6595	pF
$C_{oss}$	Output Capacitance		-	355	470	pF
$C_{rss}$	Reverse Transfer Capacitance		-	200	300	pF
$Q_{g(tot)}$	Total Gate Charge at 10V	$V_{DS} = 60\text{V}$ , $I_D = 75\text{A}$ $V_{GS} = 10\text{V}$	-	91	118	nC
$Q_{gs}$	Gate to Source Gate Charge		-	22	-	nC
$Q_{gd}$	Gate to Drain "Miller" Charge		-	28	-	nC

### Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 37.5\text{V}$ , $I_D = 75\text{A}$ $R_{GEN} = 25\Omega$ , $V_{GS} = 10\text{V}$	-	45	100	ns
$t_r$	Turn-On Rise Time		-	158	326	ns
$t_{d(off)}$	Turn-Off Delay Time		-	244	498	ns
$t_f$	Turn-Off Fall Time		-	102	214	ns

### Drain-Source Diode Characteristics

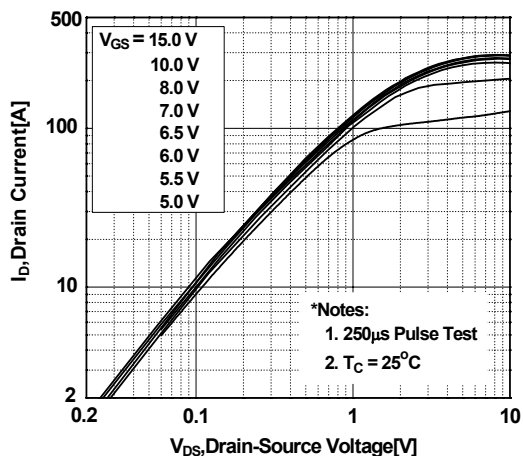
$I_S$	Maximum Continuous Drain to Source Diode Forward Current	-	-	85	A	
$I_{SM}$	Maximum Pulsed Drain to Source Diode Forward Current	-	-	340	A	
$V_{SD}$	Drain to Source Diode Forward Voltage	$V_{GS} = 0\text{V}$ , $I_{SD} = 75\text{A}$	-	-	1.25	V
$t_{rr}$	Reverse Recovery Time	$V_{GS} = 0\text{V}$ , $I_{SD} = 75\text{A}$	-	41.1	-	ns
$Q_{rr}$	Reverse Recovery Charge	$di_F/dt = 100\text{A}/\mu\text{s}$ (Note 4)	-	80.7	-	nC

#### Notes:

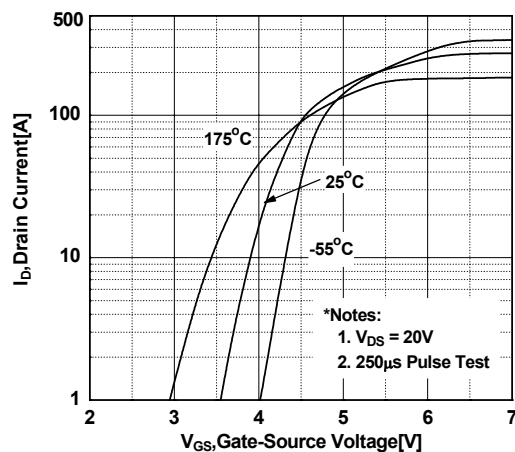
1. Repetitive Rating: Pulse width limited by maximum junction temperature
2.  $L = 0.11\text{mH}$ ,  $I_{AS} = 75\text{A}$ ,  $V_{DD} = 50\text{V}$ ,  $R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$
3.  $I_{SD} \leq 75\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$
4. Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$
5. Essentially Independent of Operating Temperature Typical Characteristics

## Typical Performance Characteristics

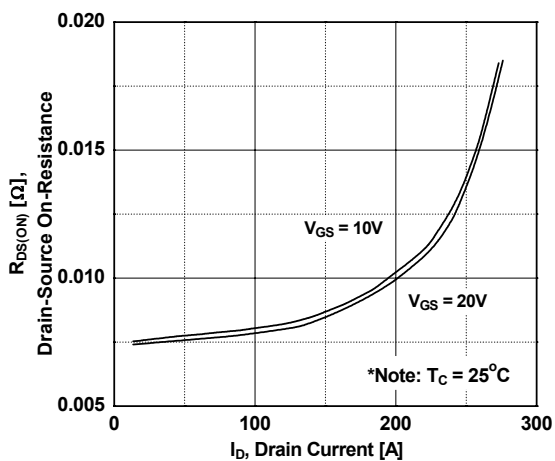
**Figure 1. On-Region Characteristics**



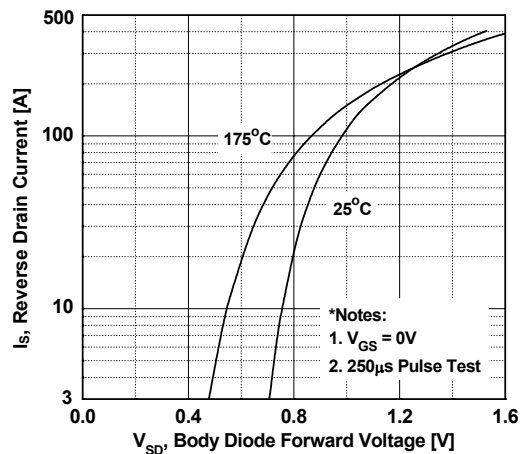
**Figure 2. Transfer Characteristics**



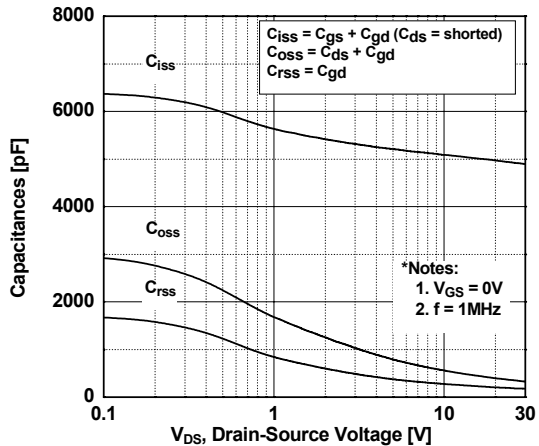
**Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage**



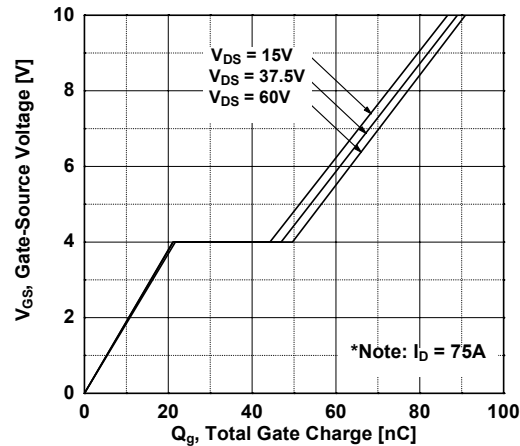
**Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature**



**Figure 5. Capacitance Characteristics**



**Figure 6. Gate Charge Characteristics**



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

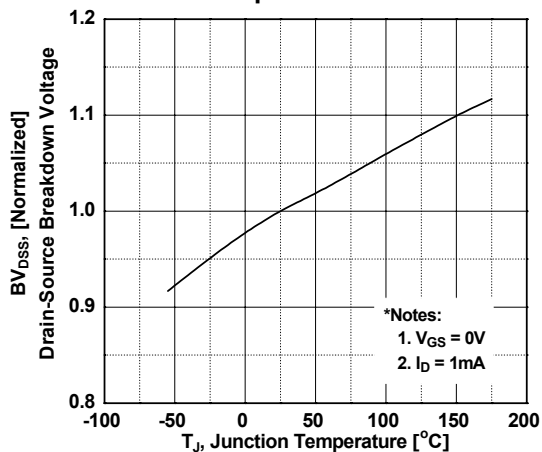


Figure 8. On-Resistance Variation vs. Temperature

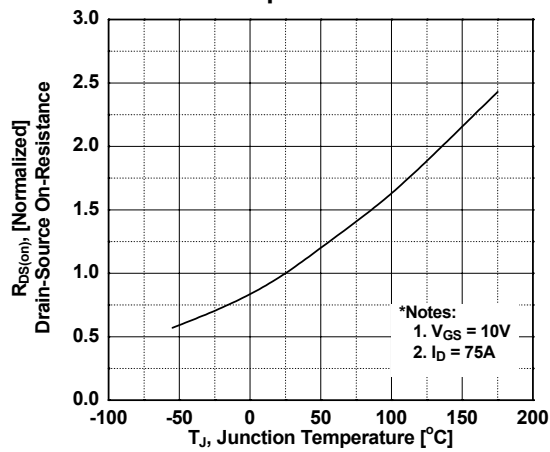


Figure 9. Maximum Safe Operating Area

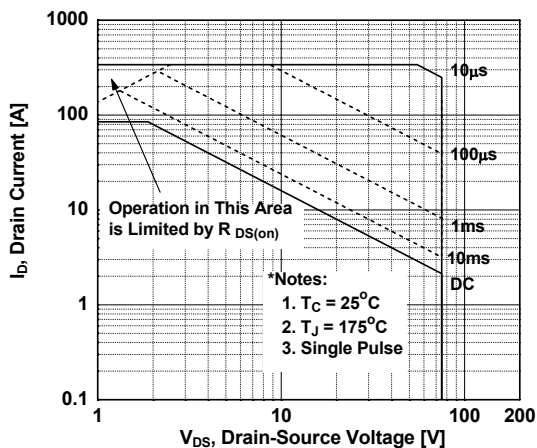


Figure 10. Maximum Drain Current vs. Case Temperature

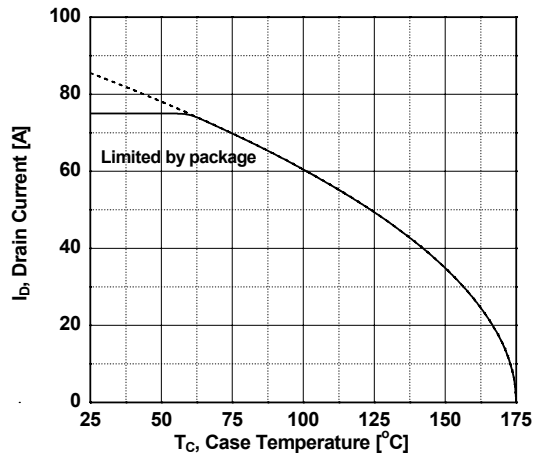
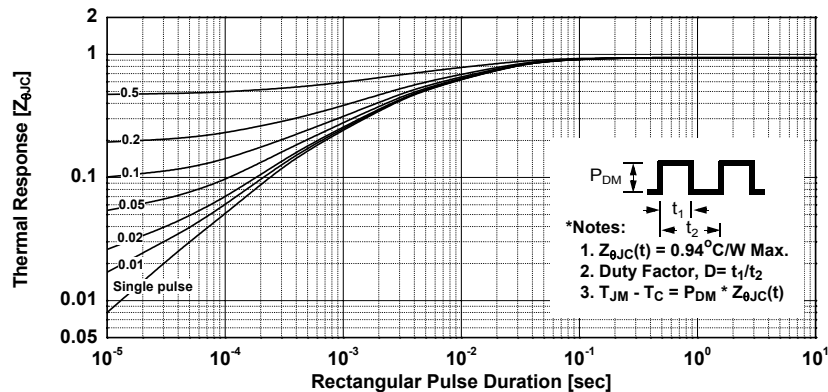
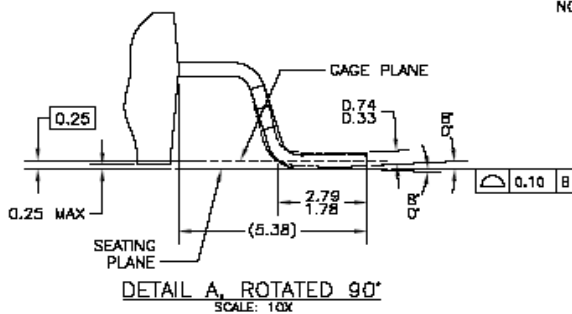
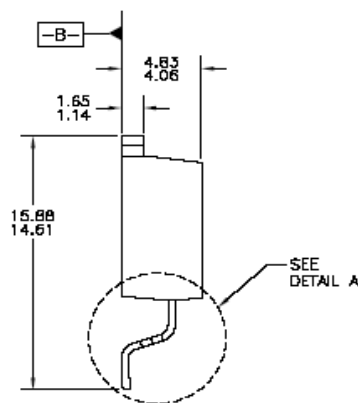
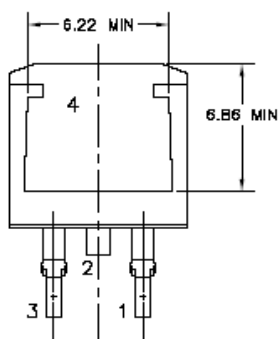
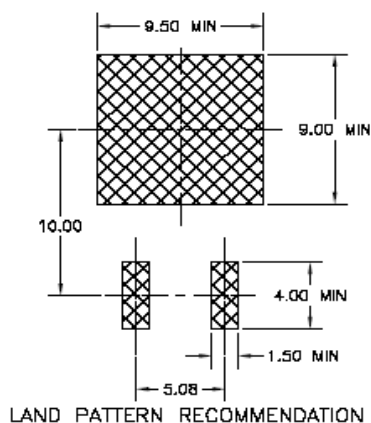
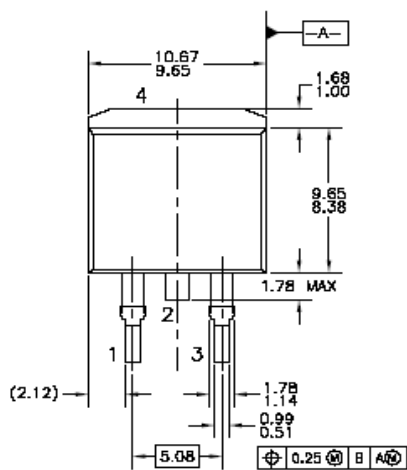


Figure 11. Transient Thermal Response Curve



**Mechanical Dimensions**

**D2-PAK**



- NOTES: UNLESS OTHERWISE SPECIFIED
- A) ALL DIMENSIONS ARE IN MILLIMETERS.
  - B) REFERENCE JEDEC, TO-263, ISSUE D, VARIATION AB, DATED JULY 2003.
  - C) DIMENSIONING AND TOLERANCING PER ANSI Y14.5M - 1982.
  - D) LOCATION OF THE PIN HOLE MAY VARY (LOWER LEFT CORNER, LOWER CENTER AND CENTER OF THE PACKAGE).
  - E) PRESENCE OF TRIMMED CENTER LEAD IS OPTIONAL.







T02B3AD2REV0

Dimensions in Millimeters



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