

FDB047N10

N-Channel PowerTrench[®] MOSFET 100V, 164A, 4.7m Ω

Description

- $R_{DS(on)} = 3.9 \text{m}\Omega$ (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 handing capability
- · RoHS compliant



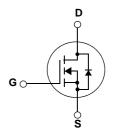
General Description

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

Application

• DC to DC converters / Synchronous Rectification





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

Symbol		Parameter		Ratings	Units
V_{DSS}	Drain to Source Voltage			100	V
V_{GSS}	Gate to Source Voltage			±20	V
	Drain Current - Co	ontinuous (T _C = 25°C, Silicon	Limited)	164*	Α
I_D	- Co	ontinuous (T _C = 100°C, Silicon	Limited)	116*	Α
	 Continuous (T_C = 25°C, Package Limited) 			120	Α
I _{DM}	Drain Current	rain Current - Pulsed (Note 1)		656*	Α
E _{AS}	Single Pulsed Avalanche Energ	Single Pulsed Avalanche Energy (Note 2)			mJ
dv/dt	Peak Diode Recovery dv/dt		(Note 3)	4.5	V/ns
D	Dower Dissipation	$(T_C = 25^{\circ}C)$		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
T _L	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds			300	°C

^{*}Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 120A.

Thermal Characteristics

Symbol	Parameter	Ratings	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.4	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient 62.5		C/VV

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDB047N10	FDB047N10	D2-PAK	330mm	24mm	800

Electrical Characteristics $T_C = 25^{\circ}C$ unless otherwise noted

Parameter	Test Conditions	Min.	Тур.	Max.	Units
cteristics					
Drain to Source Breakdown Voltage	$I_D = 250 \mu A, V_{GS} = 0 V, T_J = 25^{\circ} C$	100	-	-	V
Breakdown Voltage Temperature Coefficient	I _D = 250μA, Referenced to 25°C	-	0.1	-	V/°C
Zoro Gato Voltago Drain Current	V _{DS} = 100V, V _{GS} = 0V	-	-	1	
Zero Gate voltage Drain Current	$V_{DS} = 100V, V_{GS} = 0V, T_{C} = 150^{\circ}C$	-	-	500	μΑ
Gate to Body Leakage Current	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	±100	nA
	Drain to Source Breakdown Voltage Breakdown Voltage Temperature Coefficient Zero Gate Voltage Drain Current				

On Characteristics

V _{GS(th)}	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_{D} = 250 \mu A$	2.5	3.5	4.5	V
R _{DS(on)}	Static Drain to Source On Resistance	$V_{GS} = 10V, I_D = 75A$	ı	3.9	4.7	mΩ
9 _{FS}	Forward Transconductance	$V_{DS} = 10V, I_D = 75A$ (Note 4)	i	170	ı	S

Dynamic Characteristics

C _{iss}	Input Capacitance	V 25V V 2V	-	11500	15265	pF
C _{oss}	Output Capacitance	$V_{DS} = 25V, V_{GS} = 0V$ f = 1MHz	ı	1120	1500	pF
C _{rss}	Reverse Transfer Capacitance	1 - 1101112	-	455	680	pF

Switching Characteristics

t _{d(on)}	Turn-On Delay Time			-	174	358	ns
t _r	Turn-On Rise Time	$V_{DD} = 50V, I_{D} = 75A$		-	386	782	ns
t _{d(off)}	Turn-Off Delay Time	$V_{GS} = 10V, R_{GEN} = 25\Omega$		-	344	698	ns
t _f	Turn-Off Fall Time	(No	ote 4, 5)	-	244	499	ns
Q _{g(tot)}	Total Gate Charge at 10V	V _{DS} = 80V, I _D = 75A		-	160	210	nC
Q _{gs}	Gate to Source Gate Charge	$V_{GS} = 30V$, $V_{GS} = 10V$		-	56	-	nC
Q_{gd}	Gate to Drain "Miller" Charge		ote 4, 5)	-	36	-	nC

Drain-Source Diode Characteristics

I_S	Maximum Continuous Drain to Source Diode Forward Current			-	-	164	Α
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current			-	-	656	Α
V_{SD}	Drain to Source Diode Forward Voltage	$V_{GS} = 0V, I_{SD} = 75A$		-	-	1.25	V
t _{rr}	Reverse Recovery Time	$V_{GS} = 0V, I_{SD} = 75A$		=	88	-	ns
Q _{rr}	Reverse Recovery Charge	$dI_F/dt = 100A/\mu s$	(Note 4)	-	245	-	nC

Notes

- Repetitive Rating: Pulse width limited by maximum junction temperature
- 2. L = 0.41mH, I_{AS} = 75A, V_{DD} = 50V, R_{G} = 25 $\!\Omega$, Starting T_{J} = 25°C
- 3. I_{SD} \leq 75A, di/dt \leq 200A/µs, V_{DD} \leq BV_DSS, Starting T_J = 25°C
- 4. Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 2%
- 5. Essentially Independent of Operating Temperature Typical Characteristics

Typical Performance Characteristics

Figure 1. On-Region Characteristics

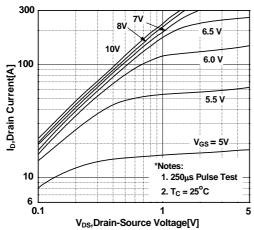


Figure 3. On-Resistance Variation vs.

Drain Current and Gate Voltage

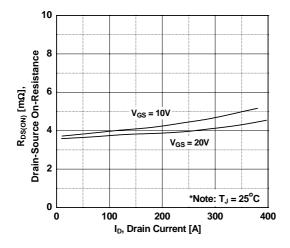


Figure 5. Capacitance Characteristics

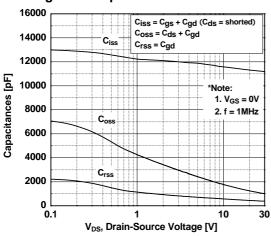


Figure 2. Transfer Characteristics

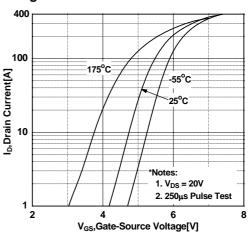


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

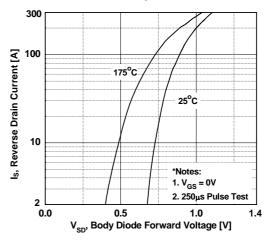
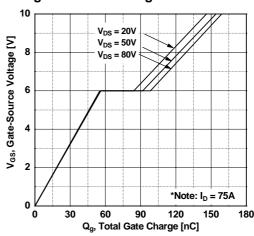


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

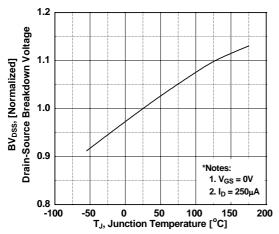


Figure 9. Maximum Safe Operating Area

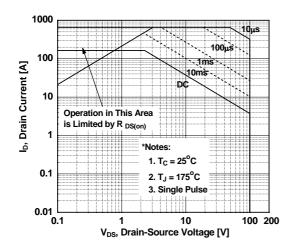


Figure 8. On-Resistance Variation vs. Temperature

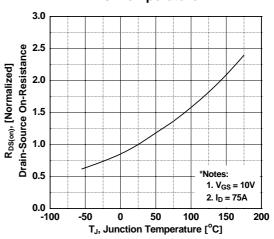


Figure 10. Maximum Drain Current vs. Case Temperature

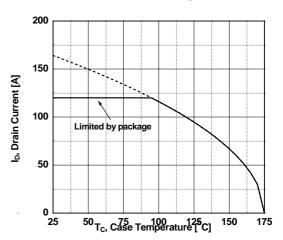
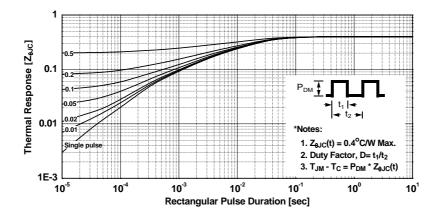
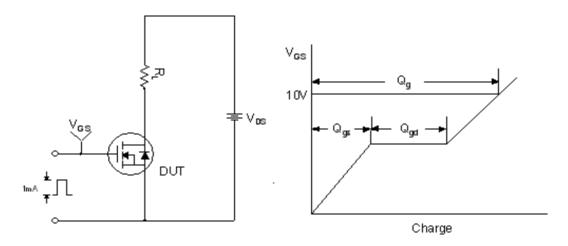


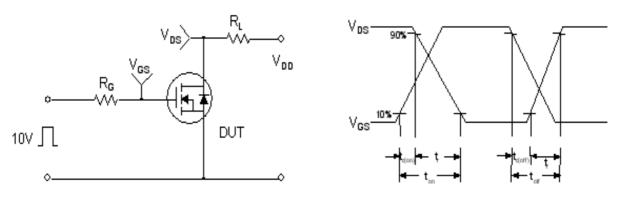
Figure 11. Transient Thermal Response Curve



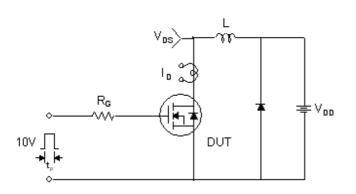
Gate Charge Test Circuit & Waveform

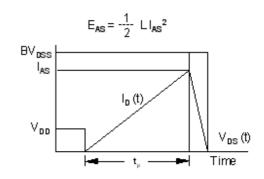


Resistive Switching Test Circuit & Waveforms

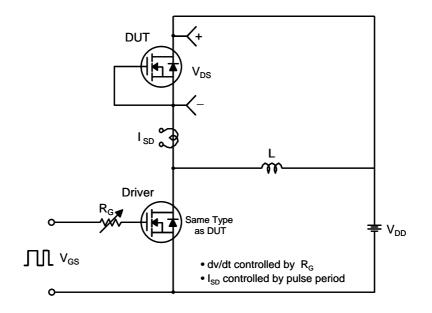


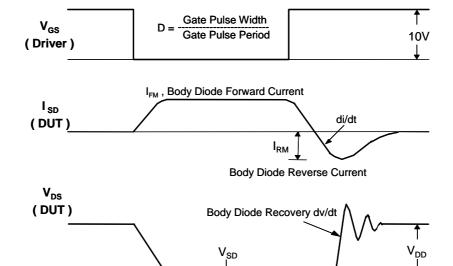
Unclamped Inductive Switching Test Circuit & Waveforms





Peak Diode Recovery dv/dt Test Circuit & Waveforms

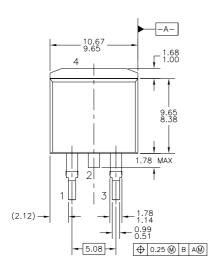


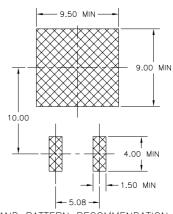


Body Diode Forward Voltage Drop

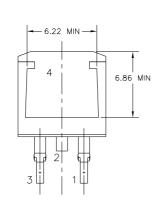
Mechanical Dimensions

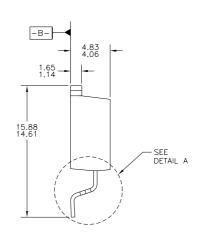
D2-PAK

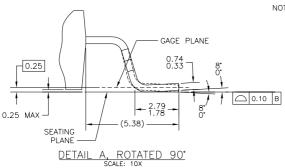




LAND PATTERN RECOMMENDATION







- 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).

 B

 E) PRESENCE OF TRIMMED CENTER LEAD IS OPTIONAL.

TO263A02REVD

Dimensions in Millimeters





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