November 1999

## FAIRCHILD SEMICONDUCTOR

## FDR8305N

## Dual N-Channel 2.5V Specified PowerTrench® MOSFET

#### **General Description**

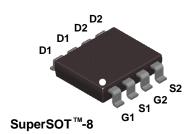
These N-Channel 2.5V specified MOSFETs are produced using Fairchild Semiconductor's advanced PowerTrench process that has been especially tailored to minimize the on-state resistance and yet maintain low gate charge for superior switching performance.

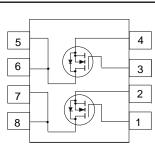
### Applications

- Load switch
- Motor driving
- Power Management

### Features

- 4.5 A, 20 V.  $R_{DS(ON)} = 0.022 \ \Omega \ @ V_{GS} = 4.5 \ V$  $R_{DS(ON)} = 0.028 \ \Omega \ @ V_{GS} = 2.5 \ V.$
- Low gate charge (16.2nC typical).
- Fast switching speed.
- High performance trench technology for extremely low  $R_{\mbox{\tiny DS(ON)}}.$
- Small footprint (38% smaller than a standard SO-8);low profile package (1 mm thick); power handling capability similar to SO-8.





## Absolute Maximum Ratings T<sub>a</sub> = 25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V <sub>DSS</sub>	Drain-Source Voltage		20	V
V <sub>GSS</sub>	Gate-Source Voltage		±8	V
ID	Drain Current - Continuous	(Note 1a)	4.5	A
	- Pulsed		20	
PD	Power Dissipation for Single Operation	(Note 1a)	0.8	W
T <sub>J</sub> , T <sub>stg</sub>	Operating and Storage Junction Temperature Range		-55 to +150	°C

## Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape Width	Quantity
.8305	FDR8305N	13"	12mm	3000 units

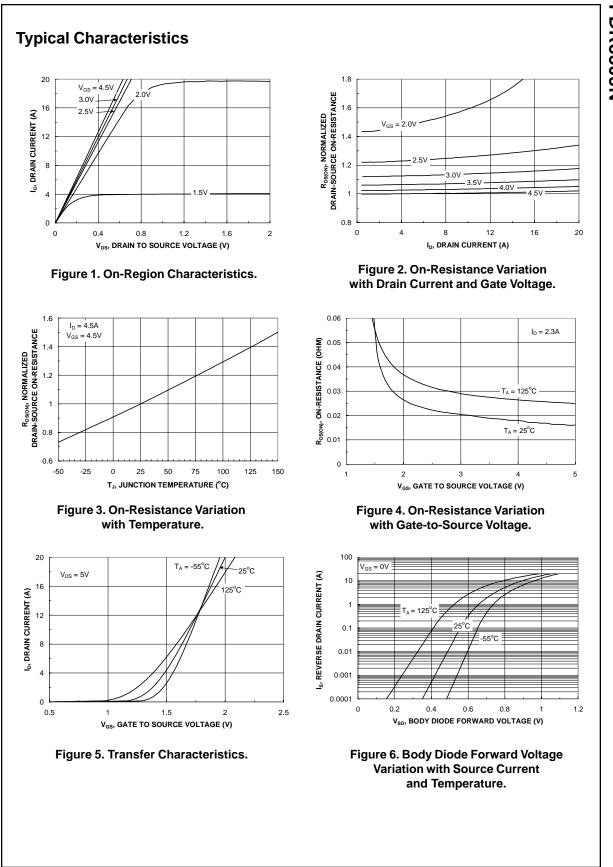
Symbol	Parameter	Test Conditions	Min	Тур	Мах	Units
Off Char	racteristics					
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	$V_{GS}$ = 0 V, $I_{D}$ = 250 $\mu$ A	20			V
<u>ΔBVdss</u> ΔTj	Breakdown Voltage Temperature Coefficient	$I_D = 250 \ \mu$ A, Referenced to $25^{\circ}$ C		14		mV/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	$V_{DS}=16~V,~V_{GS}=0~V$			1	μΑ
I <sub>GSSF</sub>	Gate-Body Leakage Current, Forward	$V_{GS} = 8 \text{ V},  V_{DS} = 0 \text{ V}$			100	nA
I <sub>GSSR</sub>	Gate-Body Leakage Current, Reverse	$V_{GS} = -8 \text{ V},  V_{DS} = 0 \text{ V}$			-100	nA
On Char	acteristics (Note 2)					
V <sub>GS(th)</sub>	Gate Threshold Voltage	$V_{DS} = V_{GS}$ , $I_D = 250 \ \mu A$	0.4	0.85	1.5	V
$rac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = 250 \ \mu$ A, Referenced to $25^{\circ}$ C		-3		mV/°C
R <sub>DS(on)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 4.5 A V <sub>GS</sub> =4.5 V, I <sub>D</sub> =4.5 A, T <sub>J</sub> =125°C V <sub>GS</sub> = 2.5 V, I <sub>D</sub> = 4 A		0.015 0.026 0.020	0.022 0.040 0.028	Ω
I <sub>D(on)</sub>	On-State Drain Current	$V_{GS} = 2.5 \text{ V}, I_D = 4 \text{ A}$ $V_{GS} = 4.5 \text{ V}, V_{DS} = 5 \text{ V}$	10			А
<b>g</b> fs	Forward Transconductance	$V_{DS} = 4.5 \text{ V}, I_D = 4.5 \text{ A}$		24		S
Dynamic	c Characteristics					
Ciss	Input Capacitance	$V_{DS} = 10 \text{ V}, V_{GS} = 0 \text{ V},$		1600		pF
Coss	Output Capacitance	f = 1.0 MHz		380		pF
Crss	Reverse Transfer Capacitance			200		pF
Switchin	ng Characteristics (Note 2)		1		ļ	
t <sub>d(on)</sub>	Turn-On Delay Time	$V_{DD} = 10 \text{ V}, \text{ I}_{D} = 1 \text{ A},$		12	22	ns
tr	Turn-On Rise Time	$V_{GS} = 4.5 \text{ V}, \text{ R}_{GEN} = 6 \Omega$		15	27	ns
t <sub>d(off)</sub>	Turn-Off Delay Time			35	55	ns
t <sub>f</sub>	Turn-Off Fall Time			18	30	ns
Qg	Total Gate Charge	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 4.5 A,		16.2	23	nC
Q <sub>gs</sub>	Gate-Source Charge	V <sub>GS</sub> = 4.5 V		2.5		nC
Q <sub>gd</sub>	Gate-Drain Charge	-		5.5		nC
-	ource Diode Characteristics ar	ad Maximum Ratings				
	Maximum Continuous Drain-Source D		1		0.67	A
Is					-	

 $156^{\circ}\text{C/W}$  on a minimum mountingpad of 2oz copper.

Scale 1 : 1 on letter size paper

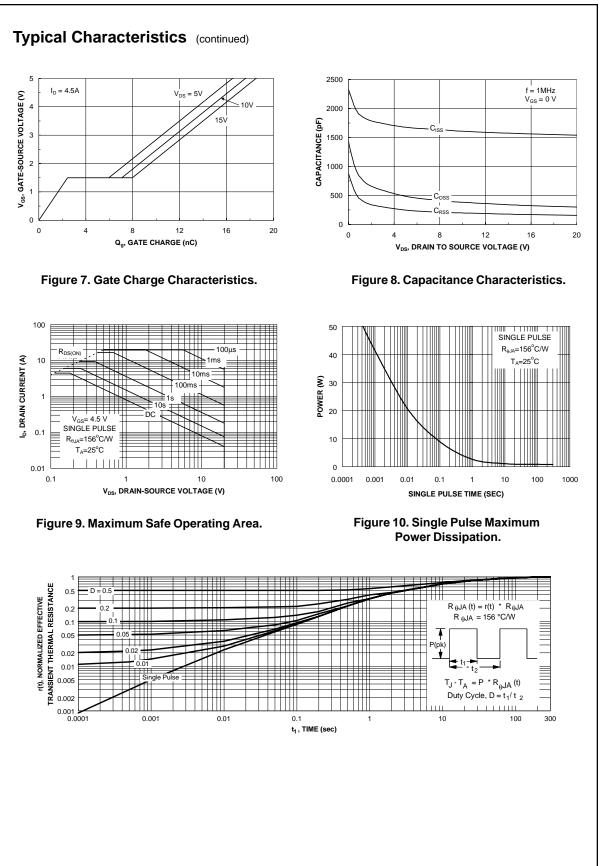
2. Pulse Test: Pulse Width  $\leq$  300µs, Duty Cycle  $\leq$  2.0%.

FDR8305N



FDR8305N Rev. C

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