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FDS9926A

Dual N-Channel 2.5V Specified PowerTrench MOSFET

General Description

These N-Channel 2.5V specified MOSFETs use Fairchild Semiconductor's advanced PowerTrench process. It has been optimized for power management applications with a wide range of gate drive voltage (2.5V – 10V).

Applications

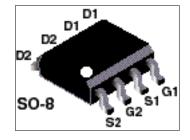
- · Battery protection
- Load switch
- · Power management

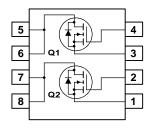
Features

6.5 A, 20 V. $R_{\text{DS(ON)}} = 30 \text{ m}\Omega \ @ \ V_{\text{GS}} = 4.5 \text{ V}$

 $R_{DS(ON)} = 43 \text{ m}\Omega$ @ $V_{GS} = 2.5 \text{ V}$.

- Optimized for use in battery protection circuits
- · Low gate charge





Absolute Maximum Ratings T_A=25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V _{DSS}	Drain-Source Voltage		20	V
V _{GSS}	Gate-Source Voltage		±10	
I _D	Drain Current - Continuous	(Note 1a)	6.5	А
	- Pulsed		20	
P _D	Power Dissipation for Dual Operation		2	W
	Power Dissipation for Single Operation	(Note 1a)	1.6	
		(Note 1b)	1	
		(Note 1c)	0.9	
T _J , T _{STG}	Operating and Storage Junction Temperature Range		-55 to +150	°C

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1a)	78	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	(Note 1)	40	

Package Marking and Ordering Information

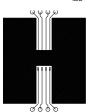
 Device Marking	Device	Reel Size	Tape width	Quantity
 FDS9926A	FDS9926A	13"	12mm	2500 units

©2003 Fairchild Semiconductor Corp. FDS9926A Rev E (W)

Symbol	Parameter	Test Conditions	Min	Тур	Max	Units
Off Char	acteristics	,				I.
BV _{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0 \text{ V}, \qquad I_{D} = 250 \mu\text{A}$	20			V
ΔBV _{DSS} ΔT _J	Breakdown Voltage Temperature Coefficient	I_D = 250 μ A, Referenced to 25°C		14		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 16 \text{ V}, V_{GS} = 0 \text{ V}$			1	μΑ
I _{GSS}	Gate-Body Leakage	$V_{GS} = \pm 8 \text{ V}, V_{DS} = 0 \text{ V}$			±100	nA
On Char	acteristics (Note 2)					
V _{GS(th)}	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_{D} = 250 \ \mu A$	0.6	1	1.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I_D = 250 μ A, Referenced to 25°C		-3		mV/°C
R _{DS(on)}	Static Drain–Source On–Resistance	$V_{GS} = 4.5 \text{ V}, I_D = 6.5 \text{ A}$ $V_{GS} = 2.5 \text{ V}, I_D = 5.4 \text{ A}$ $V_{GS} = 4.5 \text{ V}, I_D = 6.5 \text{A}, T_J = 125^{\circ}\text{C}$		25 35 35	30 43 50	mΩ
I _{D(on)}	On-State Drain Current	$V_{GS} = 4.5 \text{ V}, V_{DS} = 5 \text{ V}$	15			Α
g FS	Forward Transconductance	$V_{DS} = 5 \text{ V}, \qquad I_{D} = 6.5 \text{ A}$		22		S
Dynamic	Characteristics					
C _{iss}	Input Capacitance	$V_{DS} = 10 \text{ V}, V_{GS} = 0 \text{ V},$		650		pF
Coss	Output Capacitance	f = 1.0 MHz		150		pF
C_{rss}	Reverse Transfer Capacitance			85		pF
R_G	Gate Resistance	$V_{GS} = 15 \text{ mV}, f = 1.0 \text{ MHz}$		1.4		Ω
Switchin	g Characteristics (Note 2)					•
t _{d(on)}	Turn-On Delay Time	$V_{DD} = 10 \text{ V}, I_{D} = 1 \text{ A},$		8	16	ns
t _r	Turn-On Rise Time	$V_{GS} = 4.5 \text{ V}, R_{GEN} = 6 \Omega$		9	17	ns
t _{d(off)}	Turn-Off Delay Time			15	26	ns
t _f	Turn-Off Fall Time			4	9	ns
Q _g	Total Gate Charge	$V_{DS} = 10 \text{ V}, I_{D} = 3 \text{ A},$		6.2	9	nC
Q _{gs}	Gate-Source Charge	V _{GS} = 4.5 V		1.2		nC
Q_{gd}	Gate-Drain Charge			1.7		nC
Drain-So	ource Diode Characteristics ar	nd Maximum Ratings				
V _{SD}	Drain-Source Diode Forward Voltage			0.73	1.3	V
t _{rr}	Diode Reverse Recovery Time	$I_F = 6.5 \text{ A}, d_{iF}/d_t = 100 \text{ A/}\mu\text{s}$		15		nS
Qrr	Diode Reverse Recovery Charge	1		5		nC

Notes:

R_{8JA} is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. R_{8JC} is guaranteed by design while R_{8CA} is determined by the user's board design.



a) 78°/W when mounted on a 0.5in² pad of 2 oz copper



b) 125°/W when mounted on a 0.02 in² pad of 2 oz copper



c) 135°/W when mounted on a minimum pad.

Scale 1 : 1 on letter size paper

2. Pulse Test: Pulse Width < $300\mu s$, Duty Cycle < 2.0%

Typical Characteristics

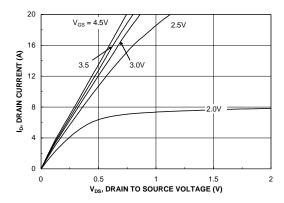


Figure 1. On-Region Characteristics.

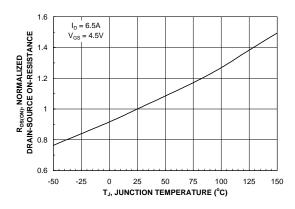


Figure 3. On-Resistance Variation with Temperature.

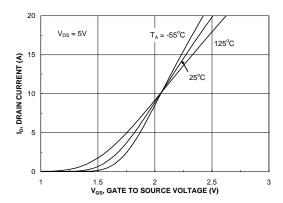


Figure 5. Transfer Characteristics.

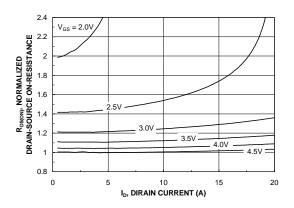


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

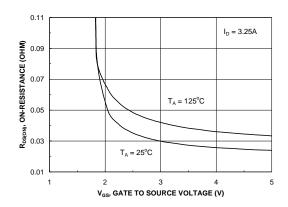


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

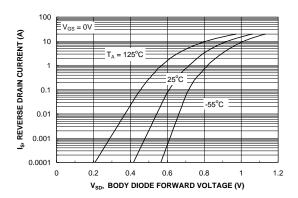
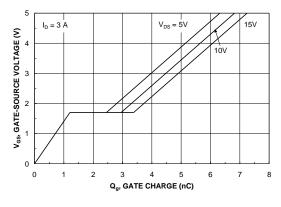


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics



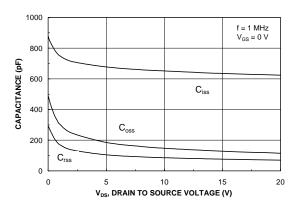
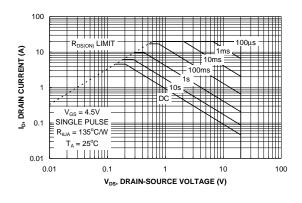


Figure 7. Gate Charge Characteristics.





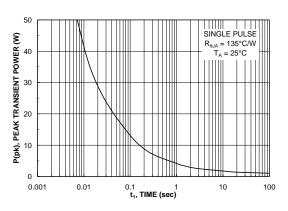


Figure 9. Maximum Safe Operating Area.

Figure 10. Single Pulse Maximum Power Dissipation.

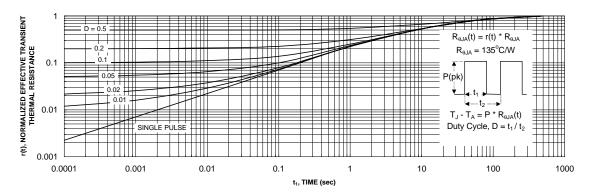


Figure 11. Transient Thermal Response Curve.

Thermal characterization performed using the conditions described in Note 1c. Transient thermal response will change depending on the circuit board design.

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