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March 2010

FAIRCHILD SEMICONDUCTOR®

FDS6930B
Dual N-Channel Logic Level PowerTrench® MOSFET

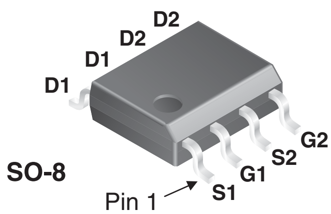
Features

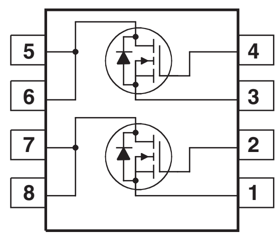
- 5.5 A, 30 V. $R_{DS(ON)}$ = 38 mΩ @ V_{GS} = 10 V
  $R_{DS(ON)}$ = 50 mΩ @ V_{GS} = 4.5 V
- Fast switching speed
- Low gate charge
- High performance trench technology for extremely low $R_{DS(ON)}$
- High power and current handling capability

General Description

These N-Channel Logic Level MOSFETs are 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.

These devices are well suited for low voltage and battery powered applications where low in-line power loss and fast switching are required.





Absolute Maximum Ratings T_A = 25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V_{DSS}	Drain-Source Voltage		30	V
V_{GSS}	Gate-Source Voltage		± 20	V
I_D	Drain Current – Continuous	(Note 1a)	5.5	A
	– Pulsed		20	
P_D	Power Dissipation for Dual Operation	(Note 1)	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	°C/W

Package Marking and Ordering Information

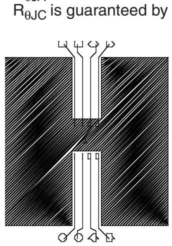
Device Marking	Device	Reel Size	Tape width	Quantity
FDS6930B	FDS6930B	13"	12mm	2500 units

Electrical Characteristics $T_A = 25°C$ unless otherwise noted

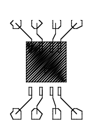
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain–Source Breakdown Voltage	$V_{GS} = 0$ V, $I_D = 250$ µA	30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250$ µA, Referenced to 25°C		26		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 24$ V, $V_{GS} = 0$ V $V_{DS} = 24$ V, $V_{GS} = 0$ V, $T_J = 55°C$			1 10	µA
I_{GSS}	Gate–Source Leakage	$V_{GS} = \pm 20$ V, $V_{DS} = 0$ V			±100	nA
On Characteristics (Note 2)						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = 250$ µA	1	1.9	3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = 250$ µA, Referenced to 25°C		–4.6		mV/°C
$R_{DS(on)}$	Static Drain–Source On–Resistance	$V_{GS} = 10$ V, $I_D = 5.5$ A $V_{GS} = 4.5$ V, $I_D = 4.8$ A $V_{GS} = 10$ V, $I_D = 5.5$ A, $T_J = 125°C$		31 40 45	38 50 62	mΩ
$I_{D(on)}$	On–State Drain Current	$V_{GS} = 10$ V, $V_{DS} = 5$ V	20			A
g_{FS}	Forward Transconductance	$V_{DS} = 5$ V, $I_D = 5.5$ A		19		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = 15$ V, $V_{GS} = 0$ V, f = 1.0 MHz		310	412	pF
C_{oss}	Output Capacitance			90	120	pF
C_{rss}	Reverse Transfer Capacitance			40	60	pF
R_G	Gate Resistance	$V_{GS} = 15$ mV, f = 1.0 MHz		1.9		Ω
Switching Characteristics (Note 2)						
$t_{d(on)}$	Turn–On Delay Time	$V_{DD} = 15$ V, $I_D = 1$ A, $V_{GS} = 10$ V, $R_{GEN} = 6$ Ω		6	12	ns
t_r	Turn–On Rise Time			6	12	ns
$t_{d(off)}$	Turn–Off Delay Time			16	28	ns
t_f	Turn–Off Fall Time			2	4	ns
Q_g	Total Gate Charge	$V_{DS} = 15$ V, $I_D = 5.5$ A, $V_{GS} = 5$ V		2.7	3.8	nC
Q_{gs}	Gate–Source Charge			1.0		nC
Q_{gd}	Gate–Drain Charge			0.7		nC
Drain–Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain–Source Diode Forward Current				1.3	A
V_{SD}	Drain–Source Diode Forward Voltage	$V_{GS} = 0$ V, $I_S = 1.3$ A (Note 2)		0.8	1.2	V
t_{rr}	Diode Reverse Recovery Time (note3)	$I_F = 5.5$ A, $d_{iF}/d_t = 100$ A/µs		16	32	nS
Q_{rr}	Diode Reverse Recovery Charge			6		nC

Notes:

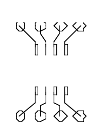
1. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a) 78°C/W when mounted on a 0.5 in^2 pad of 2 oz copper



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



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

Scale 1 : 1 on letter size paper

2. Pulse Test: Pulse Width < 300µs, Duty Cycle < 2.0%
3. Trr parameter will not be subjected to 100% production testing.

Typical Characteristics

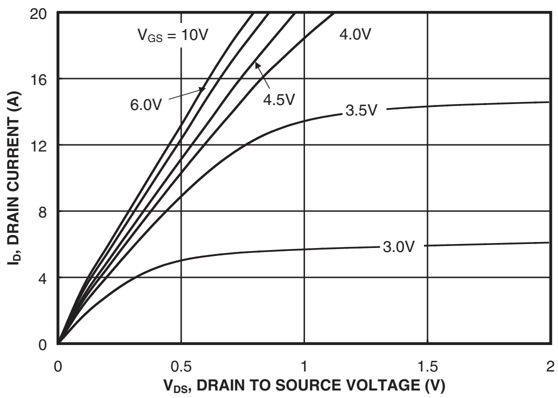


Figure 1. On-Region Characteristics.

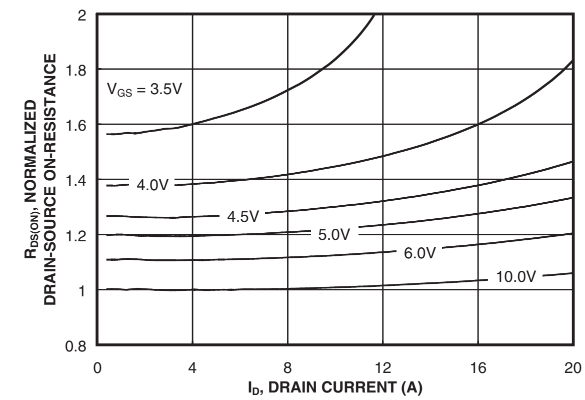


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

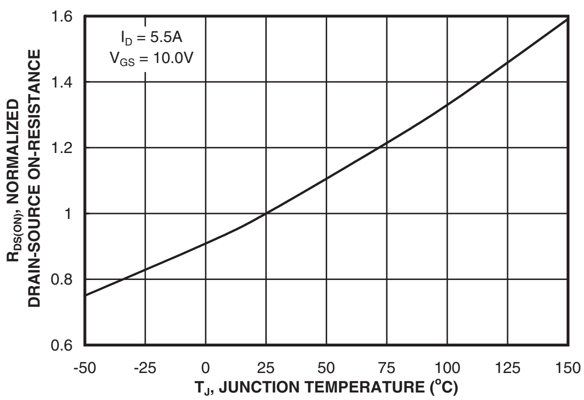


Figure 3. On-Resistance Variation with Temperature.

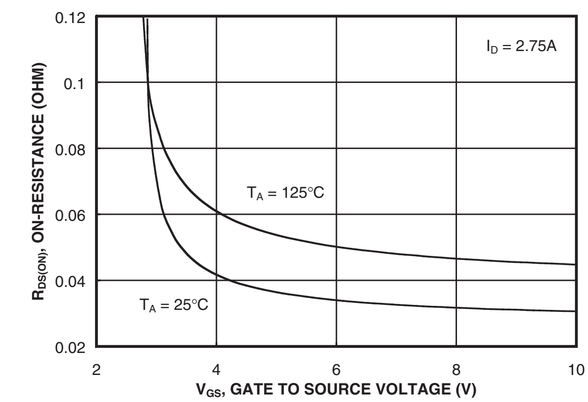


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

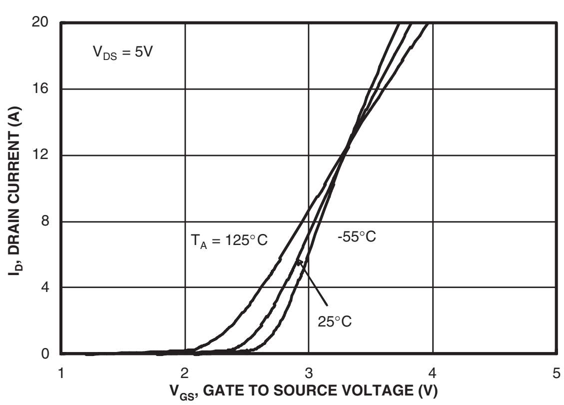


Figure 5. Transfer Characteristics.

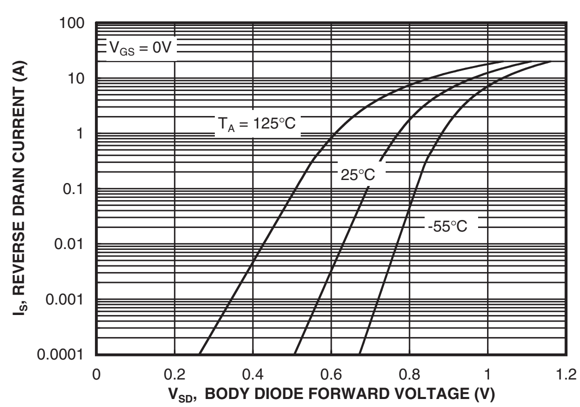


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics

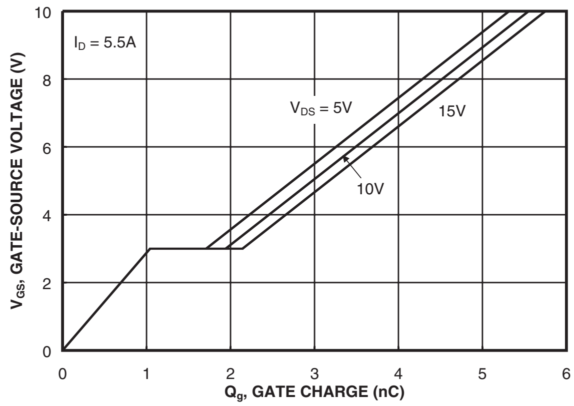


Figure 7. Gate Charge Characteristics.

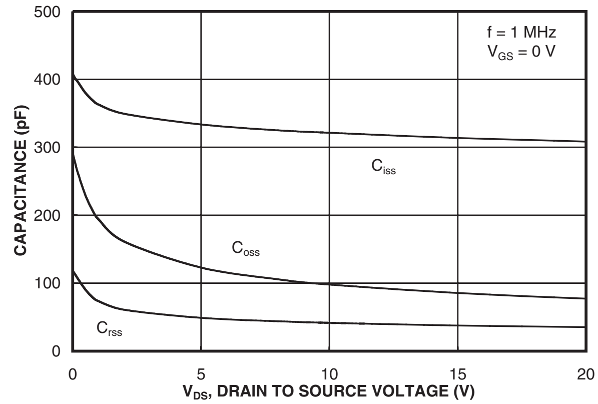


Figure 8. Capacitance Characteristics.

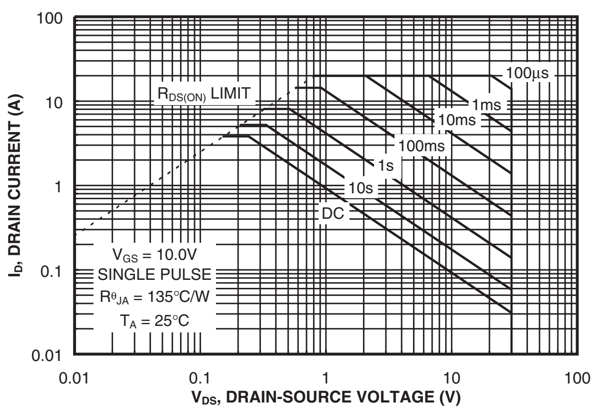


Figure 9. Maximum Safe Operating Area.

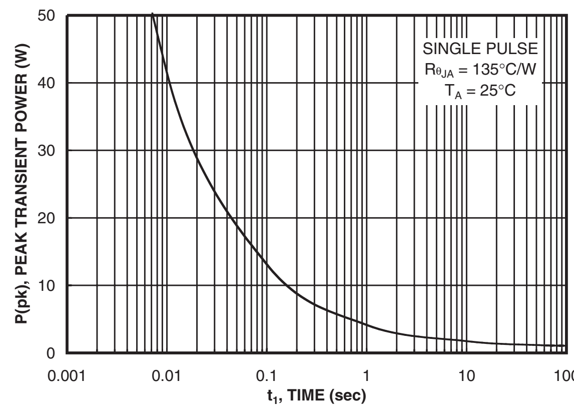


Figure 10. Single Pulse Maximum Power Dissipation.

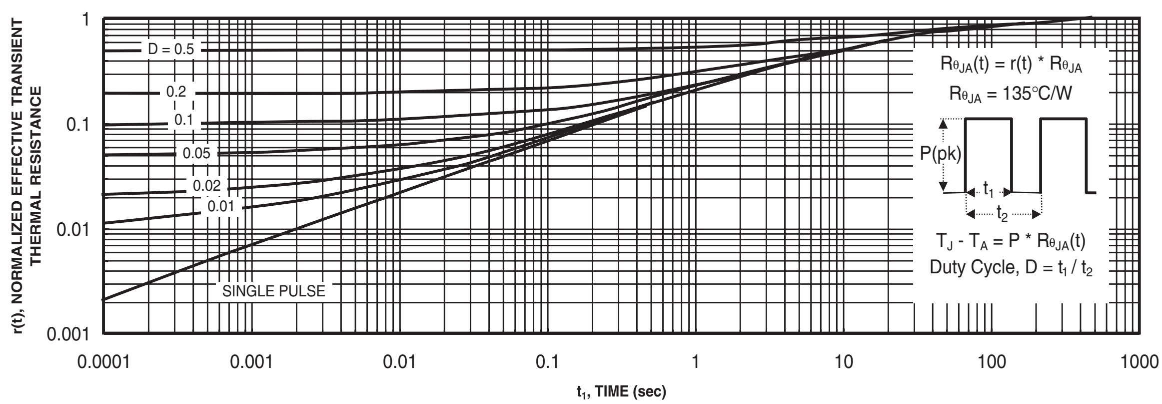


Figure 11. Transient Thermal Response Curve.

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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No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.

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