FAIRCHILD SEMICONDUCTOR®

October 2006

FDW2508PB
Dual P-Channel –1.8V Specified PowerTrench® MOSFET
–12V, –6A, 18mΩ

Features

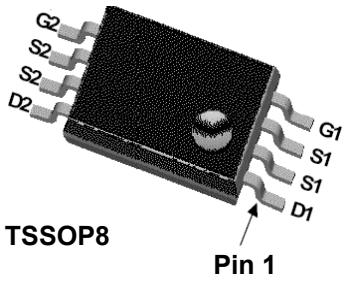
- Max $r_{DS(on)}$ = 18mΩ at V_{GS} = –4.5V, I_D = –6A
- Max $r_{DS(on)}$ = 22mΩ at V_{GS} = –2.5V, I_D = –5A
- Max $r_{DS(on)}$ = 30mΩ at V_{GS} = –1.8V, I_D = –4A
- Low gate charge
- High performance trench technology for extremely low $r_{DS(on)}$
- Low profile TSSOP-8 package
- RoHS compliant

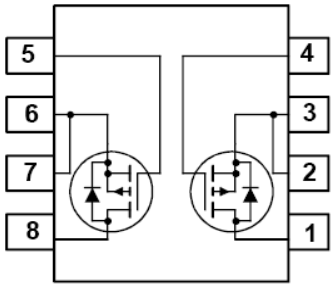
General Description

This P-Channel –1.8V specified MOSFET uses Fairchild Semiconductor's advanced low voltage PowerTrench®. It has been optimized for battery power management applications.

Application

- Power management
- Load switch
- Battery protection





MOSFET Maximum Ratings T_A = 25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V_{DS}	Drain to Source Voltage		–12	V
V_{GS}	Gate to Source Voltage		±8	V
I_D	Drain Current -Continuous	(Note 1a)	–6	A
	-Pulsed		–30	
P_D	Power Dissipation-Dual Operation		2	W
	Power Dissipation-Single Operation	(Note 1a)	1.6	
		(Note 1b)	1	
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)	80	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1b)	125	

Package Marking and Ordering Information

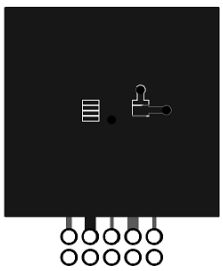
Device Marking	Device	Package	Reel Size	Tape Width	Quantity
2508PB	FDW2508PB	TSSOP-8	13"	12mm	2500 units

Electrical Characteristics T_J = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = –250μA, V_{GS} = 0V	–12			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = –250μA, referenced to 25°C		–12		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = –10V, V_{GS} = 0V			–1	μA
		V_{GS} = 0V, T_J = 125°C			–100	
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±8V, V_{DS} = 0V			±100	nA
On Characteristics (Note 2)						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = –250μA	–0.4	–0.6	–1.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = –250μA, referenced to 25°C		3		mV/°C
$r_{DS(on)}$	Static Drain to Source On-Resistance	V_{GS} = –4.5V, I_D = –6A		15	18	mΩ
		V_{GS} = –2.5V, I_D = –5A		18	22	
		V_{GS} = –1.8V, I_D = –4A		22	30	
		V_{GS} = –4.5V, I_D = –6A, T_J = 125°C		23	30	
g_{FS}	Forward Transconductance	V_{DS} = –5V, I_D = –6A		35		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = –6V, V_{GS} = 0V, f = 1MHz		2835	3775	pF
C_{oss}	Output Capacitance			440	590	pF
C_{rss}	Reverse Transfer Capacitance			370	555	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = –6V, I_D = –6A, V_{GS} = –4.5V, R_{GEN} = 6Ω		8	16	ns
t_r	Rise Time			16	29	ns
$t_{d(off)}$	Turn-Off Delay Time			254	407	ns
t_f	Fall Time			106	170	ns
Q_g	Total Gate Charge	V_{GS} = –4.5V, V_{DD} = –6V, I_D = –6A		32	45	nC
Q_{gs}	Gate to Source Gate Charge			4.3		nC
Q_{gd}	Gate to Drain “Miller” Charge			7.1		nC
Drain-Source Diode Characteristics						
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0V, I_S = –1.1A (Note 2)		–0.6	–1.2	V
t_{rr}	Reverse Recovery Time	I_F = –6A, di/dt = 100A/μs		106	159	ns
Q_{rr}	Reverse Recovery Charge			110	165	nC

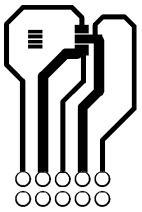
Notes:

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



a. $R_{\theta JA}$ is 80°C/W(steady state) when mounted on a 1 in^2 pad of 2 oz copper.

Scale 1 : 1 on letter size paper



b.$R_{\theta JA}$ is 125°C/W(steady state) when mounted on a minimum pad.

2: Pulse Test: Pulse Width < 300μs, Duty cycle < 2.0%.

Typical Characteristics T_J = 25°C unless otherwise noted

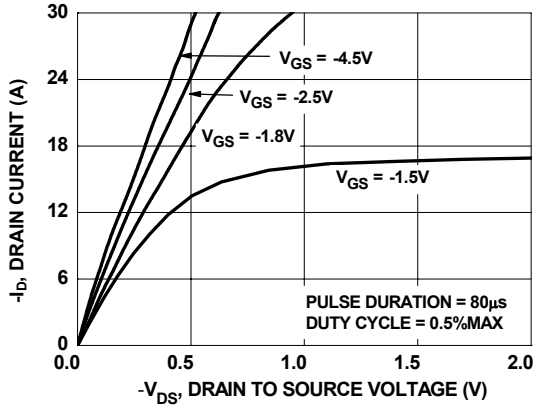


Figure 1. On Region Characteristics

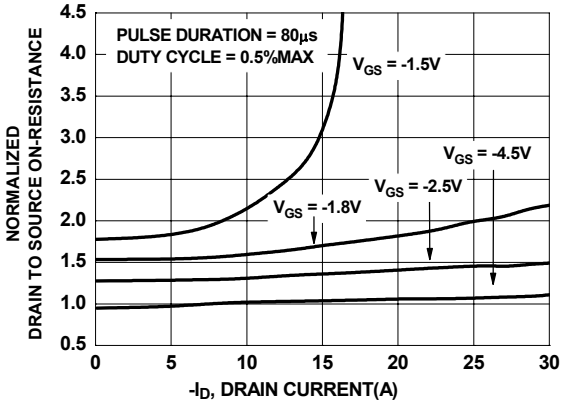


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

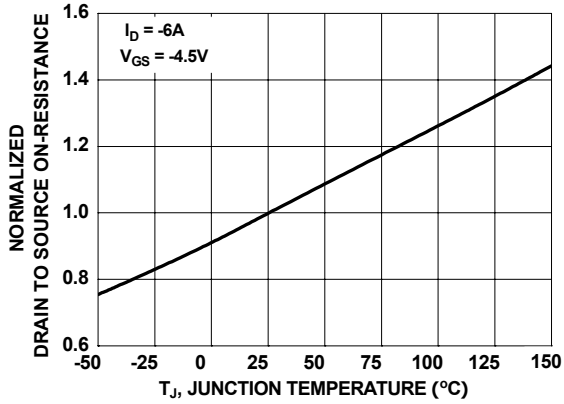


Figure 3. Normalized On Resistance vs Junction Temperature

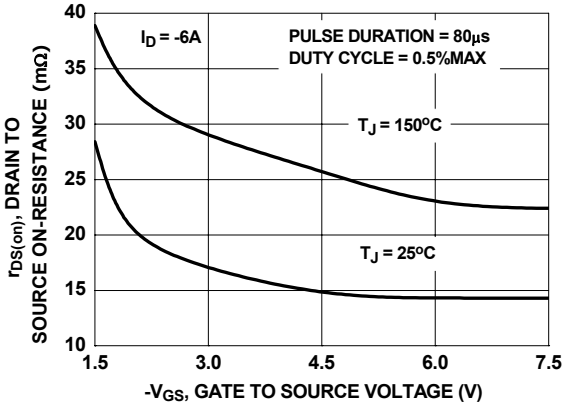


Figure 4. On-Resistance vs Gate to Source Voltage

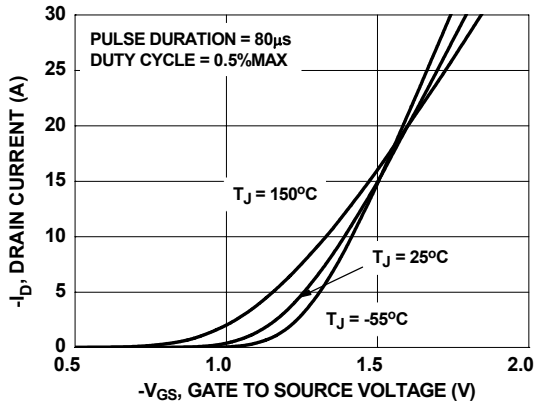


Figure 5. Transfer Characteristics

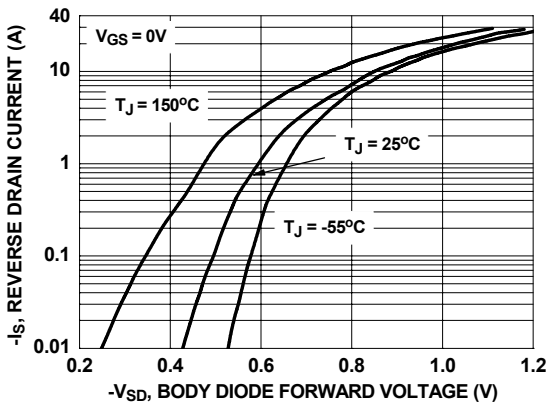


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics T_J = 25°C unless otherwise noted

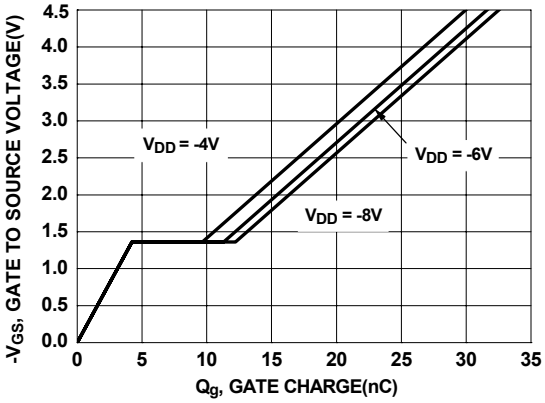


Figure 7. Gate Charge Characteristics

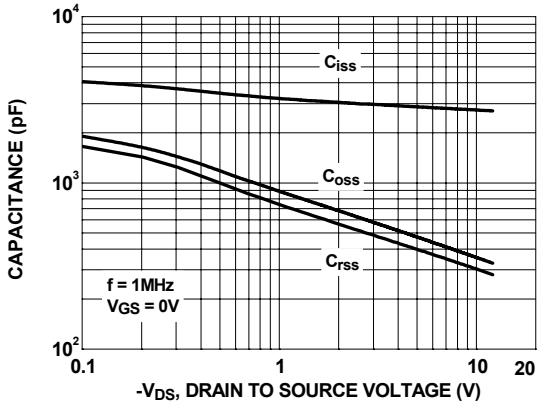


Figure 8. Capacitance vs Drain to Source Voltage

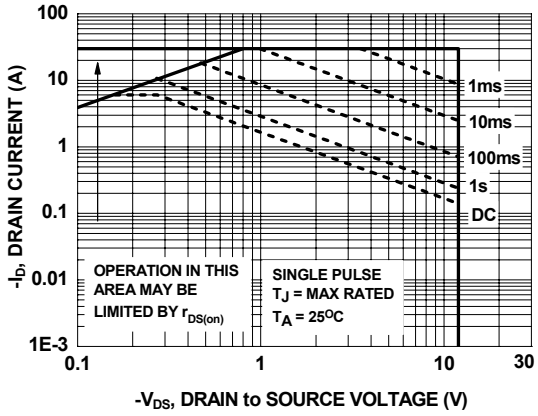


Figure 9. Forward Bias Safe Operating Area

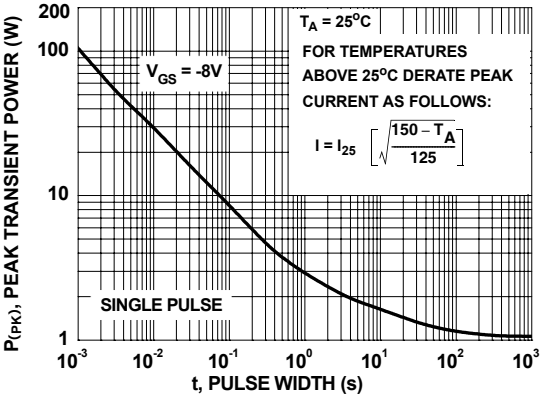


Figure 10. Single Pulse Maximum Power Dissipation

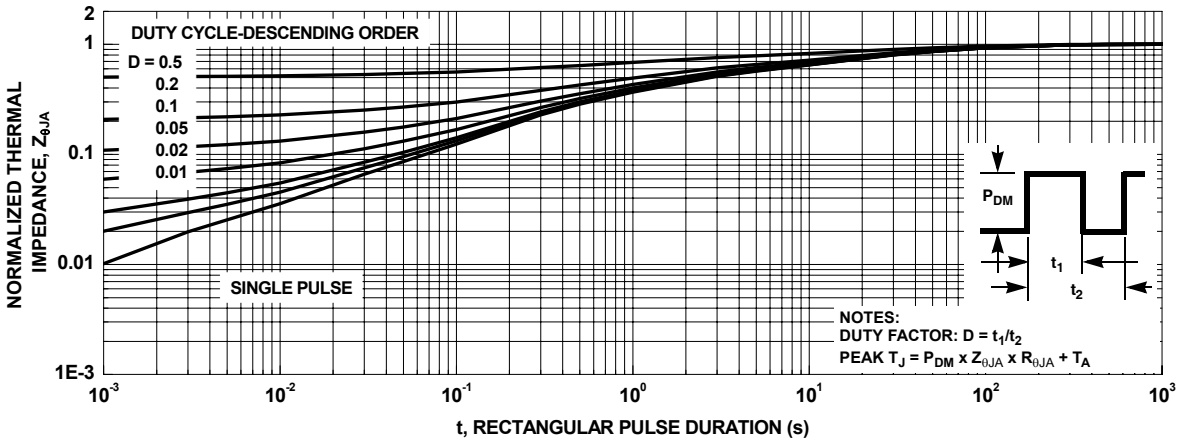
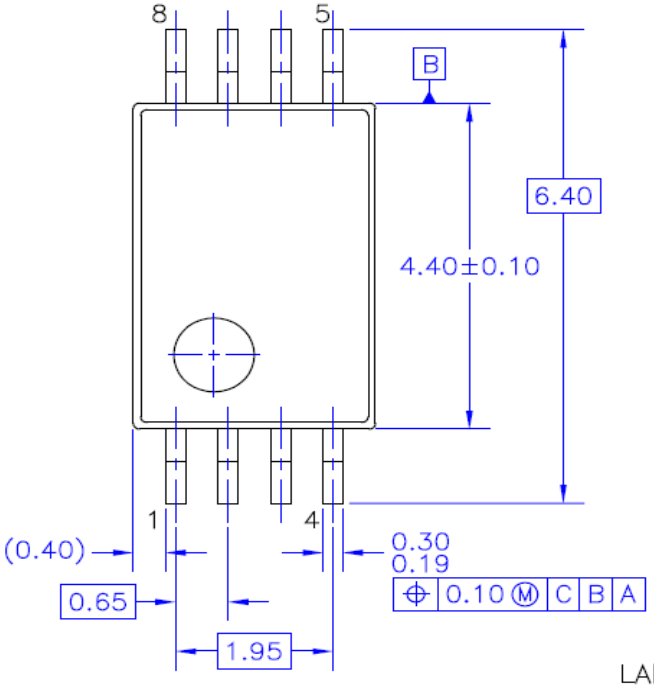
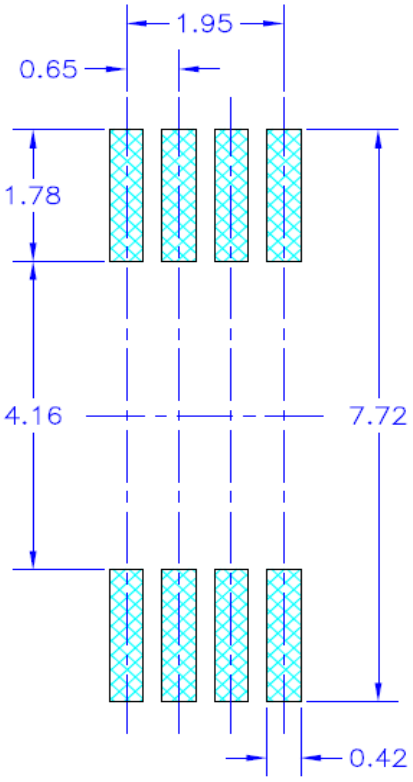
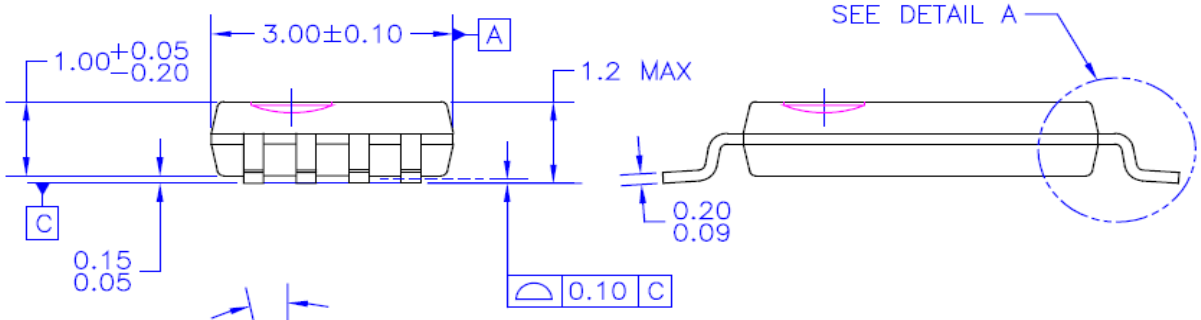


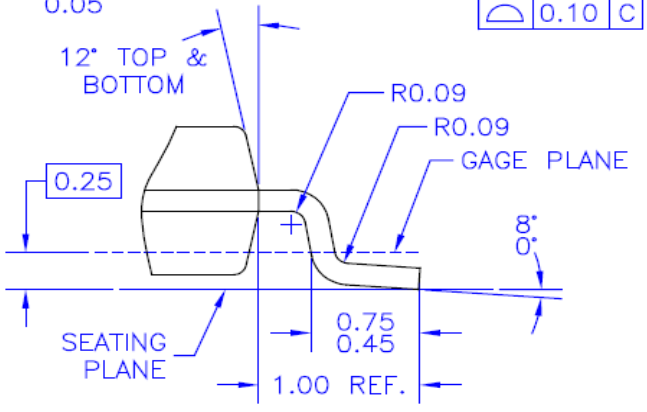
Figure 11. Transient Thermal Response Curve





LAND PATTERN RECOMMENDATION





DETAIL A

SCALE: 2X

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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
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