FAIRCHILD SEMICONDUCTOR®

January 2010

FDS6692A
N-Channel PowerTrench® MOSFET
30V, 9A, 11.5mΩ

Features

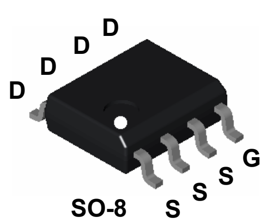
- $R_{DS(ON)}$ = 11.5mΩ, V_{GS} = 10V, I_D = 9A
- $R_{DS(ON)}$ = 14.5mΩ, V_{GS} = 4.5V, I_D = 8.2A
- High performance trench technology for extremely low $R_{DS(ON)}$
- Low gate charge
- High power and current handling capability
- RoHS Compliant

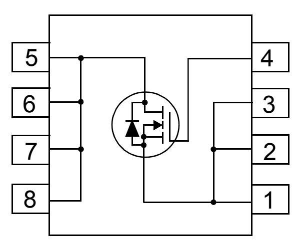
Applications

- DC/DC converters

General Description

This N-Channel MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for low gate charge, low $R_{DS(ON)}$ and fast switching speed.





MOSFET Maximum Ratings $T_A = 25°C$ unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DSS}	Drain to Source Voltage	30	V
V_{GS}	Gate to Source Voltage	±20	V
I_D	Drain Current		
	Continuous ($T_A = 25^oC$, $V_{GS} = 10V$, $R_{\theta JA} = 85^oC/W$)	9	A
	Continuous ($T_A = 25^oC$, $V_{GS} = 4.5V$, $R_{\theta JA} = 85^oC/W$)	8.2	A
	Pulsed	48	A
E_{AS}	Single Pulse Avalanche Energy (Note 1)	79	mJ
P_D	Power dissipation	1.47	W
T_J, T_{STG}	Operating and Storage Temperature	-55 to 150	^oC

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction to Ambient at 10 seconds (Note 3)	50	$^oC/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient at 1000 seconds (Note 3)	85	$^oC/W$

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDS6692A	FDS6692A	SO-8	330mm	12mm	2500 units

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
B_{VDSS}	Drain to Source Breakdown Voltage	$I_D = 250\mu A$, $V_{GS} = 0V$	30	-	-	V
$\frac{\Delta B_{VDSS}}{\Delta T_J}$	Breakdown Voltage Temp. Coefficient	$I_D = 250\mu A$, Referenced to 25^oC	-	21	-	$mV/^oC$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 24V$	-	-	1	μA
		$V_{GS} = 0V$, $T_J = 150^oC$	-	-	250	
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20V$	-	-	±100	nA
On Characteristics						
$V_{GS(TH)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 250\mu A$	1.2	-	2.5	V
$\frac{\Delta V_{GS(TH)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250\mu A$, Referenced to 25^oC	-	-5	-	$mV/^oC$
$R_{DS(ON)}$	Drain to Source On Resistance	$I_D = 9A$, $V_{GS} = 10V$	-	8.2	11.5	$m\Omega$
		$I_D = 8.2A$, $V_{GS} = 4.5V$	-	11	14.5	
		$I_D = 9A$, $V_{GS} = 10V$, $T_J = 150^oC$	-	13	19	
Dynamic Characteristics						
C_{ISS}	Input Capacitance	$V_{DS} = 15V$, $V_{GS} = 0V$, f = 1MHz	-	1210	1610	pF
C_{OSS}	Output Capacitance		-	330	440	pF
C_{RSS}	Reverse Transfer Capacitance		-	138	210	pF
R_G	Gate Resistance	f = 1MHz	-	2.0	-	Ω
$Q_{g(TOT)}$	Total Gate Charge at 10V	$V_{GS} = 0V$ to $10V$; $V_{DD} = 15V$, $I_D = 9A$, $I_g = 1.0mA$	-	22	29	nC
$Q_{g(5)}$	Total Gate Charge at 5V	$V_{GS} = 0V$ to $5V$	-	12	16	nC
$Q_{g(TH)}$	Threshold Gate Charge	$V_{GS} = 0V$ to $1V$	-	0.93	1.2	nC
Q_{gs}	Gate to Source Gate Charge		-	3	-	nC
Q_{gs2}	Gate Charge Threshold to Plateau		-	2.1	-	nC
Q_{gd}	Gate to Drain "Miller" Charge		-	4.8	-	nC

Switching Characteristics (V_{GS} = 10V)

t_{ON}	Turn-On Time	V_{DD} = 15V, I_D = 9A V_{GS} = 10V, R_{GS} = 6.2Ω	-	-	60	ns
$t_{d(ON)}$	Turn-On Delay Time		-	8	-	ns
t_r	Rise Time		-	32	-	ns
$t_{d(OFF)}$	Turn-Off Delay Time		-	33	-	ns
t_f	Fall Time		-	13	-	ns
t_{OFF}	Turn-Off Time		-	-	69	ns

Drain-Source Diode Characteristics

V_{SD}	Source to Drain Diode Voltage	I_{SD} = 9A	-	-	1.25	V
		I_{SD} = 2.1A	-	-	1.0	V
t_{rr}	Reverse Recovery Time	I_{SD} = 9A, dI_{SD}/dt=100A/μs	-	-	27	ns
Q_{RR}	Reverse Recovered Charge	I_{SD} = 9A, dI_{SD}/dt=100A/μs	-	-	17	nC

Notes:

1: Starting T_J = 25°C, L = 0.3mH, I_{AS} = 23A, V_{DD} = 27V, V_{GS} = 10V.

2: $R_{\theta JA}$ 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 $R_{\theta JA}$ is determined by the user's board design.

3: $R_{\theta JA}$ is measured with 1.0 in^2 copper on FR-4 board

Typical Characteristics T_J = 25°C unless otherwise noted

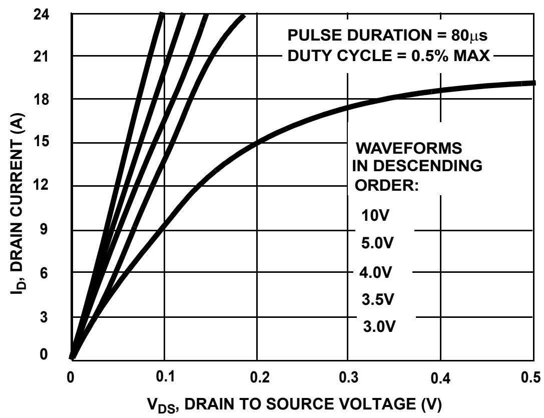


Figure 1. On Region Characteristics

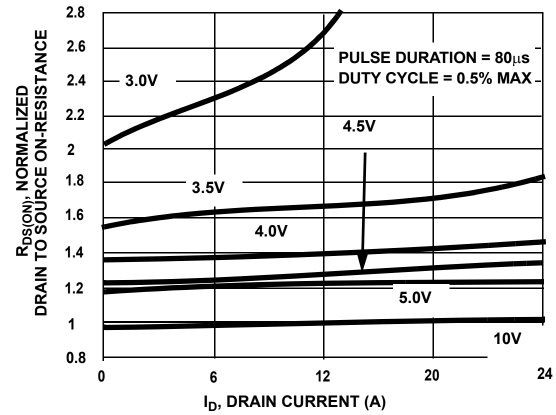


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage

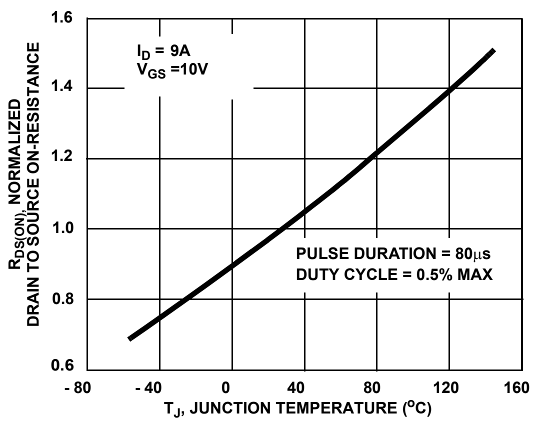


Figure 3. On Resistance Variation with Temperature

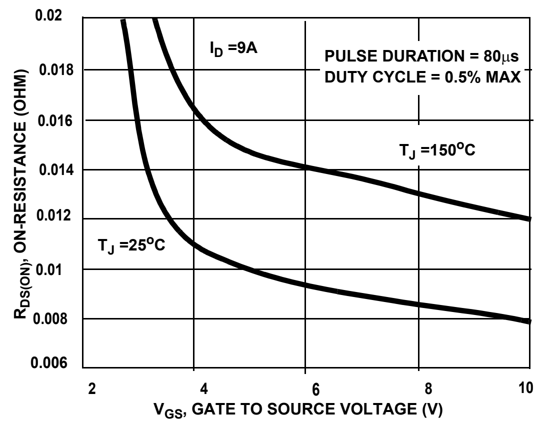


Figure 4. On-Resistance Variation with Gate-to-Source Voltage

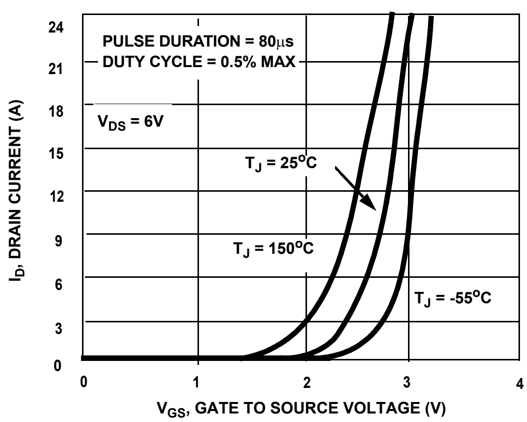


Figure 5. Transfer Characteristics

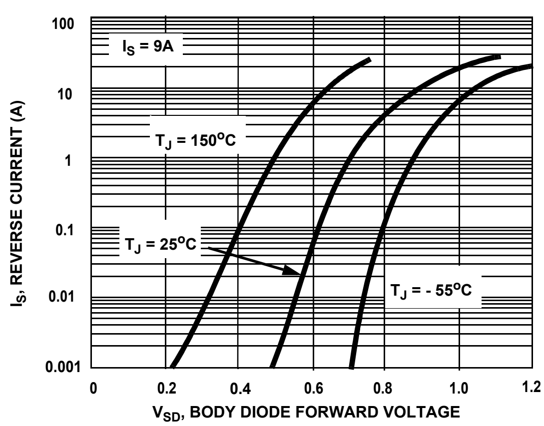


Figure 6. Body Diode Forward Voltage Variation With Source Current and Temperature

Typical Characteristics T_J = 25°C unless otherwise noted

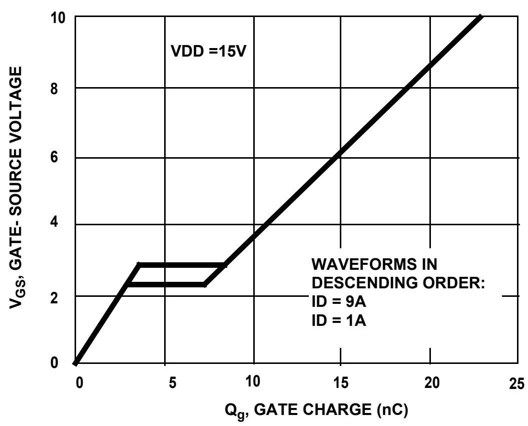


Figure 7. Gate Charge Characteristics

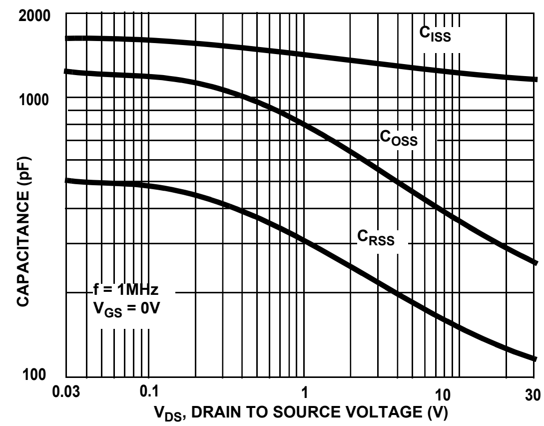


Figure 8. Capacitance Characteristics

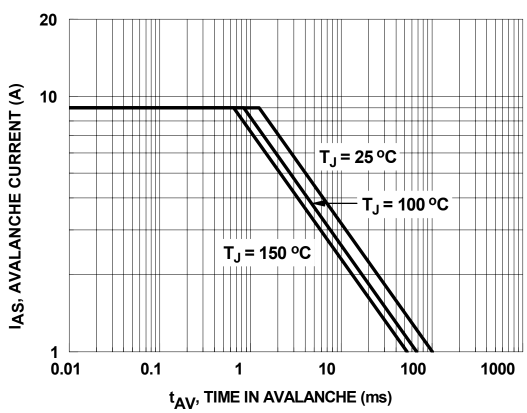


Figure 9. Unclamped Inductive Switching Capability

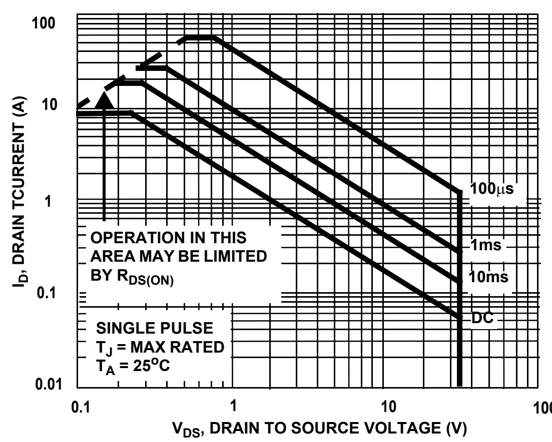


Figure 10. Safe Operating Area

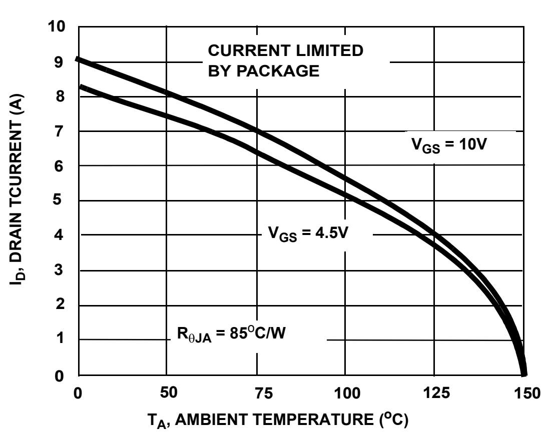


Figure 11. Maximum Continuous Drain Current vs Ambient Temperature

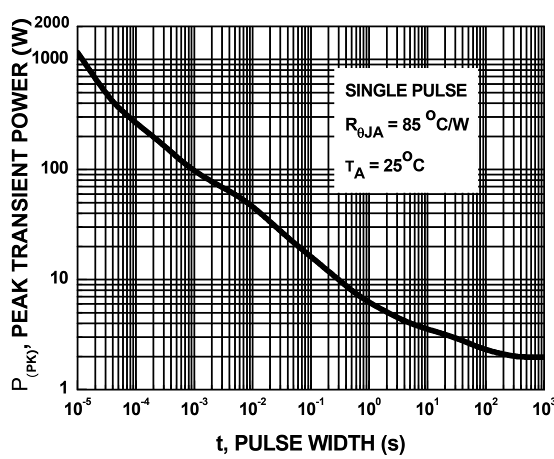


Figure 12. Single Maximum Power Dissipation

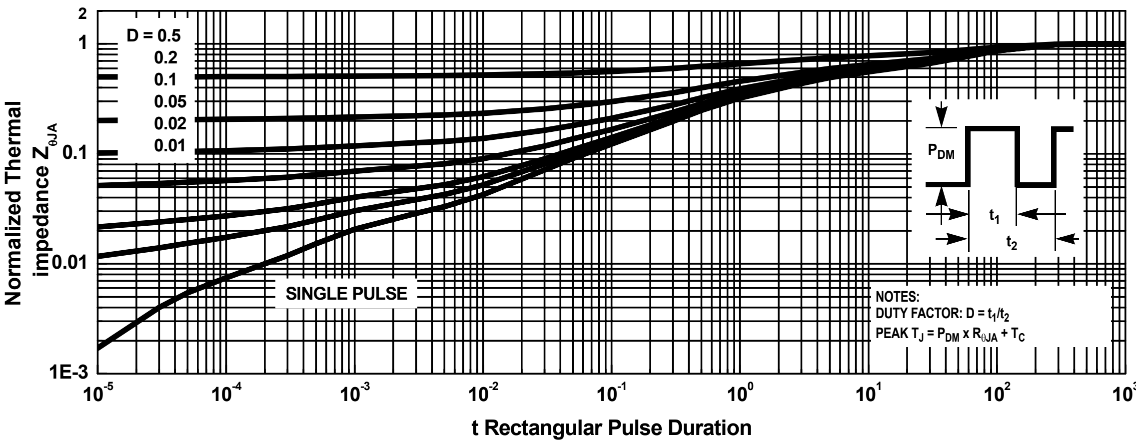


Figure 13. Transient Thermal Response Curve

FAIRCHILD SEMICONDUCTOR®

TRADEMARKS

The following includes registered and unregistered trademarks and service marks, owned by Fairchild Semiconductor and/or its global subsidiaries, and is not intended to be an exhaustive list of all such trademarks.

AccuPower™
Auto-SPM™
Build it Now™
CorePLUS™
CorePOWER™
CROSSVOLT™
CTL™
Current Transfer Logic™
DEUXPEED®
Dual Cool™
EcoSPARK®
EfficentMax™
EZSWITCH™*
™*
®
Fairchild®
Fairchild Semiconductor®
FACT Quiet Series™
FACT®
FAST®
FastvCore™
FETBench™
FlashWriter® *
FPS™
F-PFS™
FRFET®
Global Power Resource℠
Green FPS™
Green FPS™ e-Series™
Gmax™
GTO™
IntelliMAX™
ISOPLANAR™
MegaBuck™
MICROCOUPLER™
MicroFET™
MicroPak™
MicroPak2™
MillerDrive™
MotionMax™
Motion-SPM™
OptiHiT™
OPTOLOGIC®
OPTOPLANAR®
®
PDP SPM™
Power-SPM™
PowerTrench®
PowerXS™
Programmable Active Droop™
QFET®
QS™
Quiet Series™
RapidConfigure™
™
Saving our world, 1mW/W/kW at a time™
SignalWise™
SmartMax™
SMART START™
SPM®
STEALTH™
SuperFET™
SuperSOT™-3
SuperSOT™-6
SuperSOT™-8
SupreMOS™
SyncFET™
Sync-Lock™
SYSTEM GENERAL®*
The Power Franchise®
the power franchise®
TinyBoost™
TinyBuck™
TinyCalc™
TinyLogic®
TINYOPTO™
TinyPower™
TinyPWM™
TinyWire™
TriFault Detect™
TRUECURRENT™*
μSerDes™
SerDes™
UHC®
Ultra FRFET™
UniFET™
VCX™
VisualMax™
XS™

*Trademarks of System General Corporation, used under license by Fairchild Semiconductor.

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION, OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
2. A critical component in 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.

ANTI-COUNTERFEITING POLICY

Fairchild Semiconductor Corporation's Anti-Counterfeiting Policy. Fairchild's Anti-Counterfeiting Policy is also stated on our external website, www.Fairchildsemi.com, under Sales Support.

Counterfeiting of semiconductor parts is a growing problem in the industry. All manufactures of semiconductor products are experiencing counterfeiting of their parts. Customers who inadvertently purchase counterfeit parts experience many problems such as loss of brand reputation, substandard performance, failed application, and increased cost of production and manufacturing delays. Fairchild is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. Fairchild strongly encourages customers to purchase Fairchild parts either directly from Fairchild or from Authorized Fairchild Distributors who are listed by country on our web page cited above. Products customers buy either from Fairchild directly or from Authorized Fairchild Distributors are genuine parts, have full traceability, meet Fairchild's quality standards for handing and storage and provide access to Fairchild's full range of up-to-date technical and product information. Fairchild and our Authorized Distributors will stand behind all warranties and will appropriately address and warranty issues that may arise. Fairchild will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources. Fairchild is committed to combat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	Datasheet contains preliminary data; 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	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.

Rev. I46