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FAIRCHILD SEMICONDUCTOR®

March 2009

FDS6679AZ
P-Channel PowerTrench® MOSFET
-30V, -13A, 9mΩ

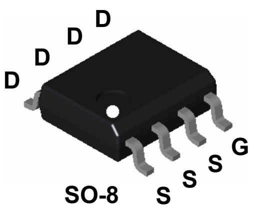
General Description

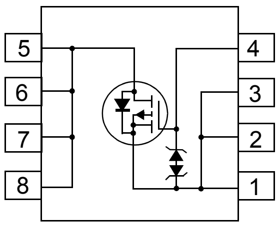
This P-Channel MOSFET is producted using Fairchild Semiconductor's advanced PowerTrench process that has been especially tailored to minimize the on-state resistance.

This device is well suited for Power Management and load switching applications common in Notebook Computers and Portable Battery Packs.

Features

- Max $r_{DS(on)}$ = 9.3mΩ at V_{GS} = -10V, I_D = -13A
- Max $r_{DS(on)}$ = 14.8mΩ at V_{GS} = -4.5V, I_D = -11A
- Extended V_{GS} range (-25V) for battery applications
- HBM ESD protection level of 6kV typical (note 3)
- High performance trench technology for extremely low $r_{DS(on)}$
- High power and current handing capability
- RoHS Compliant





MOSFET Maximum Ratings T_A = 25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V_{DS}	Drain to Source Voltage		-30	V
V_{GS}	Gate to Source Voltage		±25	V
I_D	Drain Current -Continuous	(Note 1a)	-13	A
	-Pulsed		-65	
P_D	Power Dissipation for Single Operation	(Note 1a)	2.5	W
		(Note 1b)	1.2	
		(Note 1c)	1.0	
T_J, T_{STG}	Operating and Storage Temperature		-55 to +150	°C

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance , Junction to Ambient (Note 1a)	50	°C/W
$R_{\theta JC}$	Thermal Resistance , Junction to Case (Note 1)	25	°C/W

Package Marking and Ordering Information

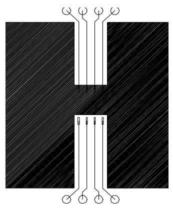
Device Marking	Device	Reel Size	Tape Width	Quantity
FDS6679AZ	FDS6679AZ	13"	12mm	2500 units

Electrical Characteristics T_J = 25°C unless otherwise noted

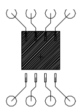
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
B_{VDSS}	Drain to Source Breakdown Voltage	I_D = -250µA, V_{GS} = 0V	-30			V
$\frac{\Delta B_{VDSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = -250µA, referenced to 25°C		-20		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -24V, V_{GS}=0V			-1	µA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±25V, V_{DS}=0V			±10	µA
On Characteristics (Note 2)						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = -250µA	-1	-1.9	-3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = -250µA, referenced to 25°C		6.5		mV/°C
$r_{DS(on)}$	Drain to Source On Resistance	V_{GS} = -10V, I_D = -13A		7.7	9.3	mΩ
		V_{GS} = -4.5V, I_D = -11A		11.8	14.8	
		V_{GS} = -10V, I_D = -13A, T_J = 125°C		10.7	13.4	
g_{FS}	Forward Transconductance	V_{DS} = -5V, I_D = -13A		55		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = -15V, V_{GS} = 0V, f = 1MHz		2890	3845	pF
C_{oss}	Output Capacitance			500	665	pF
C_{rss}	Reverse Transfer Capacitance			495	745	pF
Switching Characteristics (Note 2)						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = -15V, I_D = -1A V_{GS} = -10V, R_{GS} = 6Ω		13	24	ns
t_r	Rise Time			15	27	ns
$t_{d(off)}$	Turn-Off Delay Time			210	336	ns
t_f	Fall Time			92	148	ns
Q_g	Total Gate Charge	V_{DS} = -15V, V_{GS} = -10V, I_D = -13A		68	96	nC
Q_g	Total Gate Charge	V_{DS} = -15V, V_{GS} = -5V, I_D = -13A		38	54	nC
Q_{gs}	Gate to Source Gate Charge			10		nC
Q_{gd}	Gate to Drain Charge			17		nC
Drain-Source Diode Characteristic						
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0V, I_S = -2.1A		-0.7	-1.2	V
t_{rr}	Reverse Recovery Time	I_F = -13A, di/dt = 100A/µs			40	ns
Q_{rr}	Reverse Recovery Charge	I_F = -13A, di/dt = 100A/µs			-31	nC

Notes:

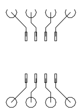
1: $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a) 50°C/W when mounted on a 1 in^2 pad of 2 oz copper



b) 105°C/W when mounted on a .04 in^2 pad of 2 oz copper



c) 125°C/W when mounted on a minimun pad

Scale 1 : 1 on letter size paper

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

3: The diode connected between the gate and source serves only as protection against ESD. No gate overvoltage rating is implied.

Typical Characteristics T_J = 25°C unless otherwise noted

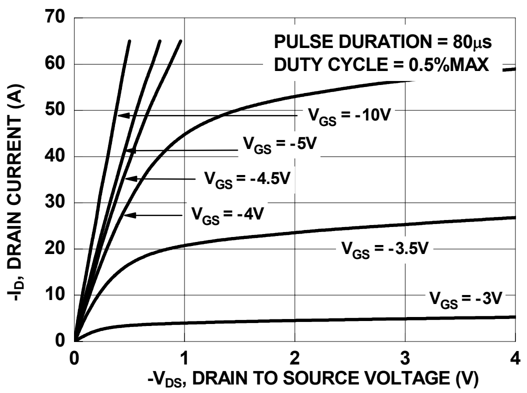


Figure 1. On Region Characteristics

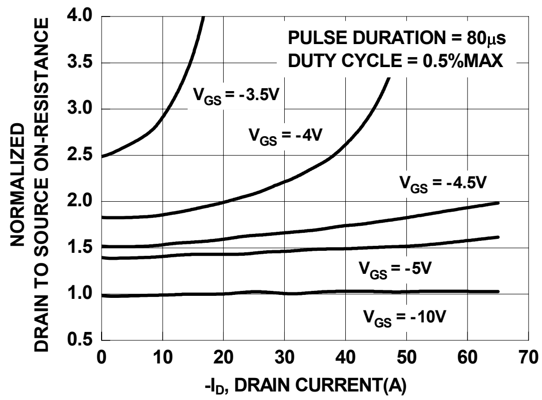


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

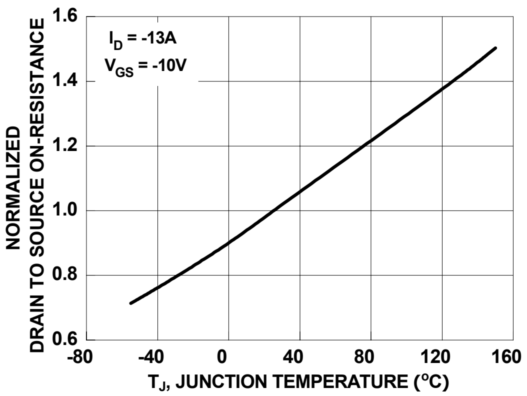


Figure 3. Normalized On Resistance vs Junction Temperature

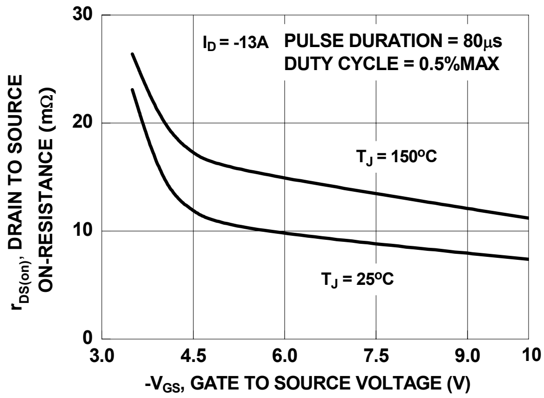


Figure 4. On-Resistance vs Gate to Source Voltage

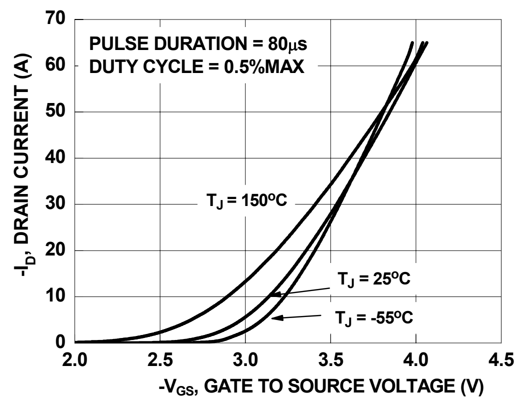


Figure 5. Transfer Characteristics

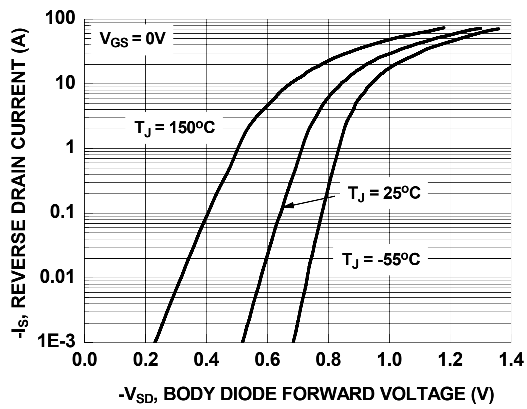


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics T_J = 25°C unless otherwise noted

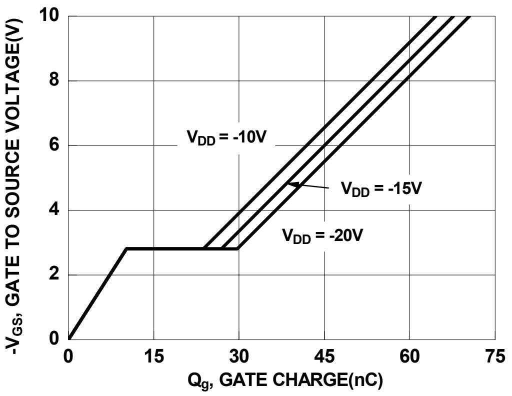


Figure 7. Gate Charge Characteristics

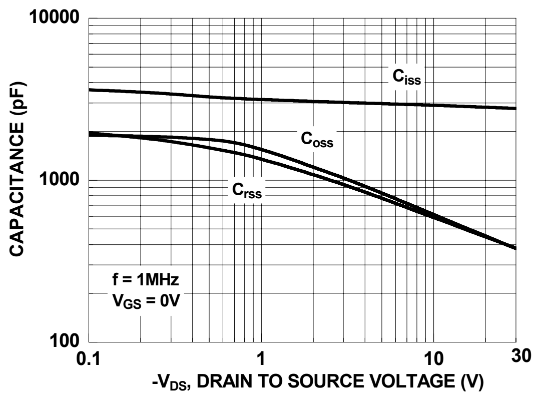


Figure 8. Capacitance vs Drain to Source Voltage

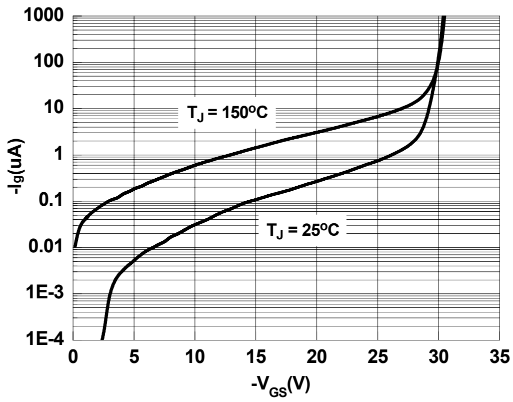


Figure 9. I_g vs V_{GS}

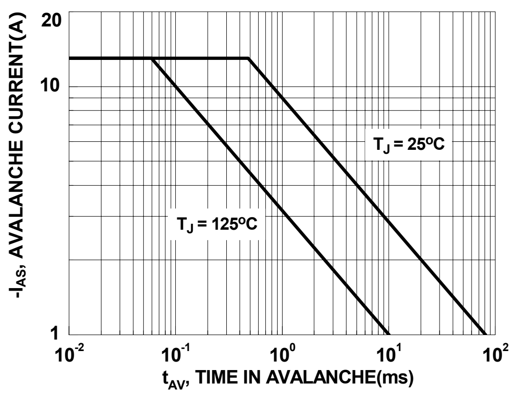


Figure 10. Unclamped Inductive Switching Capability

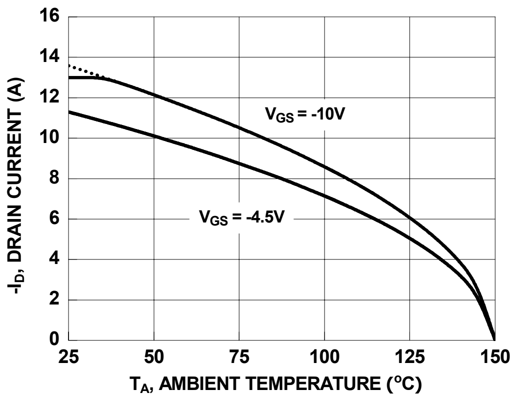


Figure 11. Maximum Continuous Drain Current vs Ambient Temperature

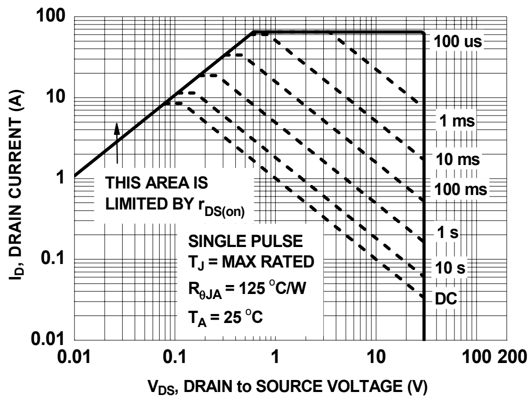


Figure 12. Forward Bias Safe Operating Area

Typical Characteristics T_J = 25°C unless otherwise noted

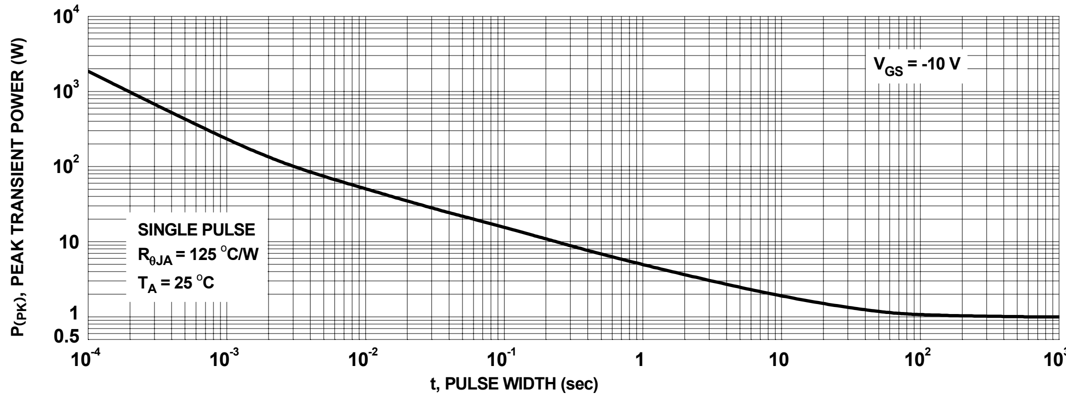


Figure 13. Single Pulse Maximum Power Dissipation

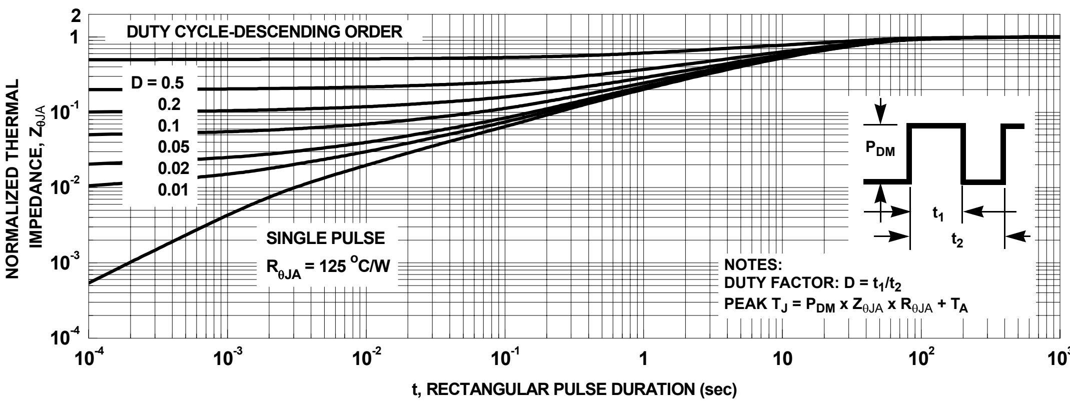


Figure 14. Junction-to-Ambient Transient Thermal Response Curve

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