April 1999

FDS6961A Dual N-Channel Logic Level PowerTrench[™] MOSFET

General Description

FAIRCHILD

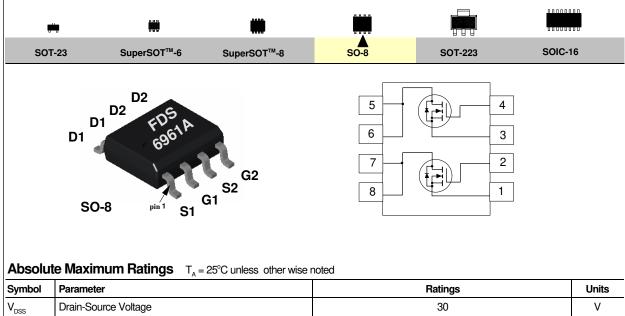
SEMICONDUCTOR IM

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.

Features

- $\begin{array}{c|c} \bullet & 3.5 \text{ A}, \ 30 \text{ V}. \ R_{\text{DS(ON)}} = 0.090 \ \Omega \ @ \ V_{\text{GS}} = 10 \ \text{V} \\ & R_{\text{DS(ON)}} = 0.140 \ \Omega \ @ \ V_{\text{GS}} = 4.5 \ \text{V}. \end{array}$
- Fast switching speed.
- Low gate charge (2.1nC typical).
- High performance trench technology for extremely low R_{DS(ON)}.
- High power and current handling capability.

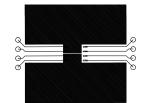


Cymbol	i ulullotoi		i iddii igo	Onito
V _{DSS}	Drain-Source Voltage		30	V
V_{GSS}	Gate-Source Voltage		±20	V
D	Drain Current - Continuous (N	ote 1a)	3.5	A
	- Pulsed		14	
P _D	Power Dissipation for Single Operation (No	ote 1)	2	W
	Power Dissipation for Single Operation (No	ote 1a)	1.6	
	(No	ote 1b)	1	
	(No	ote 1c)	0.9	
Г _J ,Т _{STG}	Operating and Storage Temperature Range		-55 to 150	C°
THERMA	L CHARACTERISTICS			
R _{θJA}	Thermal Resistance, Junction-to-Ambient (N	lote 1a)	78	°C/W
R _{euc}	Thermal Resistance, Junction-to-Case	Note 1)	40	°C/W

© 1999 Fairchild Semiconductor Corporation

Symbol	Parameter	Conditions	Min	Тур	Max	Units
OFF CHAR	ACTERISTICS					
BV _{DSS}	Drain-Source Breakdown Voltage	$V_{\rm GS} = 0 \text{ V}, \ I_{\rm D} = 250 \ \mu\text{A}$	30			V
$\Delta BV_{DSS} / \Delta T_{J}$	Breakdown Voltage Temp. Coefficient	$I_D = 250 \ \mu\text{A}$, Referenced to $25 \ ^{\circ}\text{C}$		25		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 24 V, V_{GS} = 0 V$			1	μA
		T _J = 55°C			10	μA
	Gate - Body Leakage, Forward	$V_{GS} = 20 \text{ V}, \text{ V}_{DS} = 0 \text{ V}$			100	nA
	Gate - Body Leakage, Reverse	$V_{GS} = -20 V, V_{DS} = 0 V$			-100	nA
ON CHARA	CTERISTICS (Note 2)					
V _{GS(th)}	Gate Threshold Voltage	$V_{\rm DS} = V_{\rm GS}, \ I_{\rm D} = 250 \ \mu A$	1	1.8	3	V
$\Delta V_{GS(th)} / \Delta T_J$	Gate Threshold Voltage Temp. Coefficient	$I_{D} = 250 \ \mu\text{A}$, Referenced to $25 \ ^{\circ}\text{C}$		-5		mV/°C
R _{DS(ON)}	Static Drain-Source On-Resistance	$V_{GS} = 10 \text{ V}, \text{ I}_{D} = 3.5 \text{ A}$		0.076	0.09	Ω
		T _{.1} =125°C		0.11	0.155	
		$V_{GS} = 4.5 \text{ V}, \text{ I}_{D} = 2.8 \text{ A}$		0.107	0.14	
D(ON)	On-State Drain Current	$V_{GS} = 10 \text{ V}, V_{DS} = 5 \text{ V}$	14			Α
9 _{FS}	Forward Transconductance	$V_{DS} = 15 \text{ V}, \text{ I}_{D} = 3.5 \text{ A}$		6		S
DYNAMIC (HARACTERISTICS					
C _{iss}	Input Capacitance	$V_{DS} = 15 \text{ V}, V_{GS} = 0 \text{ V},$ f = 1.0 MHz		220		pF
C _{oss}	Output Capacitance	t = 1.0 MHz		50		pF
C _{rss}	Reverse Transfer Capacitance			20		pF
SWITCHING	CHARACTERISTICS (Note 2)		1	1	1	
t _{D(on)}	Turn - On Delay Time	$V_{DS} = 15 \text{ V}, \text{ I}_{D} = 1 \text{ A}$		3	6	ns
ţ	Turn - On Rise Time	$V_{\rm GS}=10~V~,~R_{\rm GEN}=6~\Omega$		11	22	ns
D(off)	Turn - Off Delay Time			7	14	ns
f	Turn - Off Fall Time			3	6	ns
ک ⁶	Total Gate Charge	$V_{\rm DS} = 15 \text{ V}, \ \text{I}_{\rm D} = 3.5 \text{ A},$		2.1	4	nC
Q _{gs}	Gate-Source Charge	V _{GS} =5 V		0.8		nC
Q _{gd}	Gate-Drain Charge			0.7		nC
DRAIN-SOU	RCE DIODE CHARACTERISTICS AND MAXIMU	JM RATINGS				
s	Maximum Continuous Drain-Source Diode For	Forward Current			1.3	Α
V _{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0 V, I_{S} = 1.3 A$ (Note 2)		0.73	1.2	V

1. R_{BAR} 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_{BAC} is guaranteed by design while R_{BCA} is determined by the user's board design.

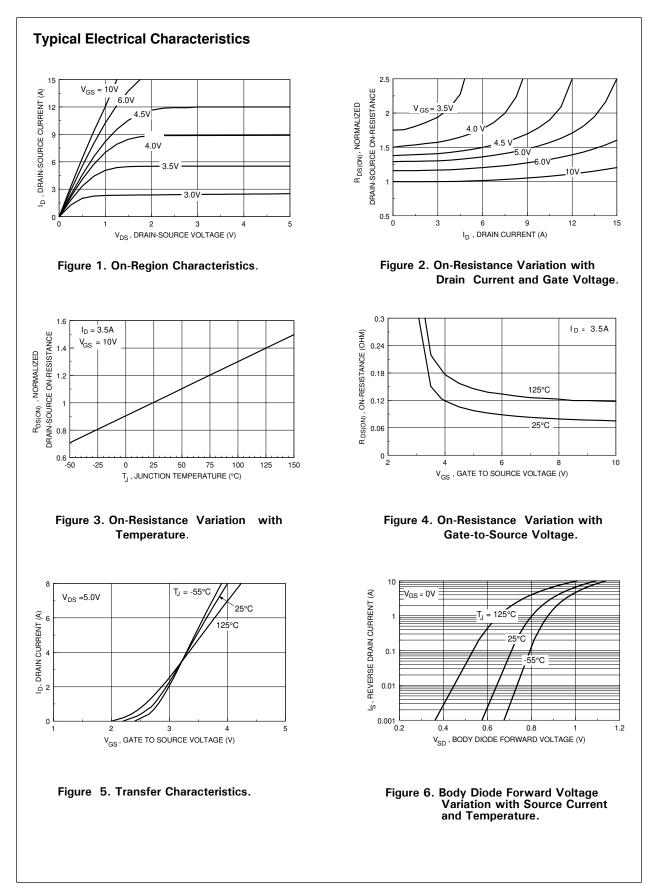




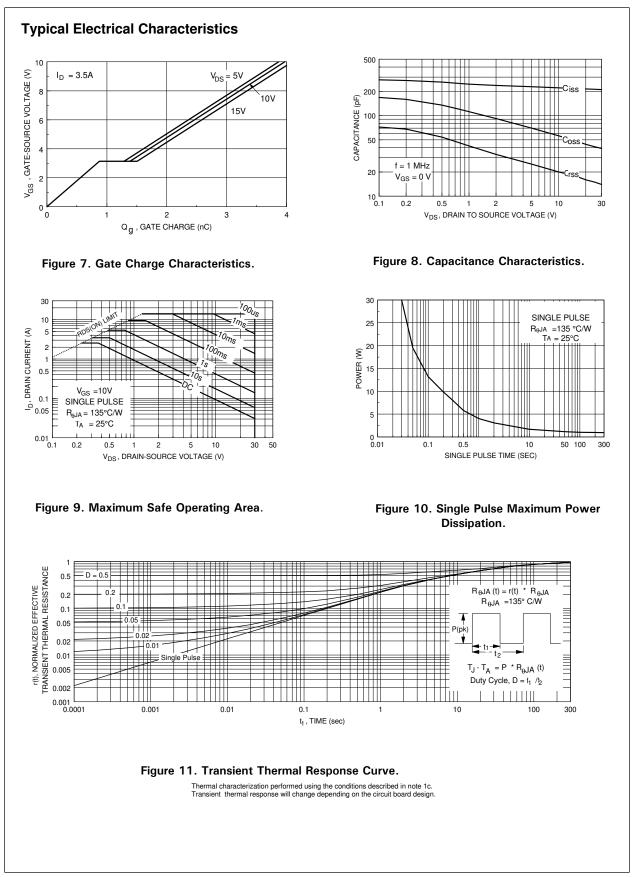
b. 125°C/W on a 0.02 in² pad of 2oz copper.

Scale 1 : 1 on letter size paper

2. Pulse Test: Pulse Width \leq 300µs, Duty Cycle \leq 2.0%.



FDS6961A Rev.C



FDS6961A Rev.C

TRADEMARKS

The following are registered and unregistered trademarks Fairchild Semiconductor owns or is authorized to use and is not intended to be an exhaustive list of all such trademarks.

ACExTM CoolFETTM CROSSVOLTTM E²CMOSTM FACTTM FACT Quiet SeriesTM FAST[®] FAST[®] FASTrTM GTOTM HiSeCTM ISOPLANAR[™] MICROWIRE[™] POP[™] PowerTrench[™] QFET[™] QS[™] Quiet Series[™] SuperSOT[™]-3 SuperSOT[™]-6 SuperSOT[™]-8

TinyLogic™ UHC™ VCX™

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.

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, or (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 significant injury to the user. 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 in order 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 in order to improve design.			
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild semicondu The datasheet is printed for reference information			