FAIRCHILD SEMICONDUCTOR®

October 2008

FDC5661N_F085

N-Channel Logic Level PowerTrench® MOSFET

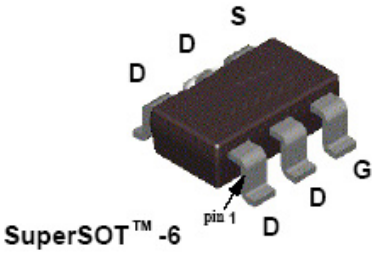
60V, 4A, 60mΩ

Features

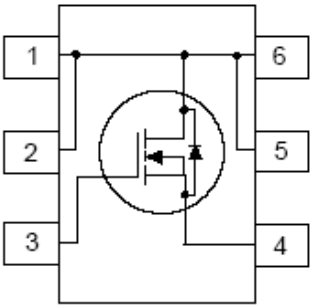
- $R_{DS(on)}$ = 47mΩ at V_{GS} = 10V, I_D = 4.3A
- $R_{DS(on)}$ = 60mΩ at V_{GS} = 4.5V, I_D = 4A
- Typ $Q_{g(TOT)}$ = 14.5nC at V_{GS} = 10V
- Low Miller Charge
- Qualified to AEC Q101
- RoHS Compliant

Applications

- DC/DC converter
- Motor Drives



SuperSOT™ -6



MOSFET Maximum Ratings T_A = 25°C unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DSS}	Drain to Source Voltage	60	V
V_{GS}	Gate to Source Voltage	±20	V
I_D	Drain Current Continuous (V_{GS} = 10V)	4.3	A
	Pulsed	20	
P_D	Power Dissipation	1.6	W
T_J, T_{STG}	Operating and Storage Temperature	-55 to +150	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance Junction to Case	30	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient TO-263, 1in^2 copper pad area	78	°C/W

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
.661N	FDC5661N_F085	SSOT-6	7”	8mm	3000 units

Electrical Characteristics T_A = 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	60	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 48V, V_{GS} = 0V	-	-	1	μA
		V_{DS} = 48V, V_{GS} = 0V, T_A = 150°C	-	-	250	
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±20V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 250μA	1	2.0	3	V
$r_{DS(on)}$	Drain to Source On Resistance	I_D = 4.3A, V_{GS}= 10V	-	38	47	mΩ
		I_D = 4A, V_{GS}= 4.5V	-	46	60	
		I_D = 4.3A, V_{GS}= 10V, T_J = 150°C	-	69	86	
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1MHz	-	763	-	pF
C_{oss}	Output Capacitance		-	68	-	pF
C_{rss}	Reverse Transfer Capacitance		-	36	-	pF
R_G	Gate Resistance	f = 1MHz	-	2.6	-	Ω
$Q_{g(TOT)}$	Total Gate Charge at 10V	V_{GS} = 0 to 10V, V_{DD} = 30V, I_D = 4.3A	-	14.5	19	nC
Q_{gs}	Gate to Source Gate Charge		-	2.4	-	nC
Q_{gd}	Gate to Drain “Miller“ Charge		-	2.9	-	nC

Electrical Characteristics T_A = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units

Switching Characteristics

t_{on}	Turn-On Time	V_{DD} = 30V, I_D = 4.3A V_{GS} = 10V, R_{GS} = 6Ω	-	-	17.6	ns
$t_{d(on)}$	Turn-On Delay Time		-	7.2	-	ns
t_r	Rise Time		-	1.6	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	19.3	-	ns
t_f	Fall Time		-	3.1	-	ns
t_{off}	Turn-Off Time		-	-	36	ns

Drain-Source Diode Characteristics

V_{SD}	Source to Drain Diode Voltage	I_{SD} = 4.3A	-	0.8	1.25	V
		I_{SD} = 2.1A	-	0.8	1.0	
t_{rr}	Reverse Recovery Time	I_{SD} = 4.3A, dI_{SD}/dt = 100A/μs	-	18.4	24	ns
Q_{rr}	Reverse Recovery Charge		-	10.0	13	nC

This product has been designed to meet the extreme test conditions and environment demanded by the automotive industry. For a copy of the requirements, see AEC Q101 at: http://www.aecouncil.com/
All Fairchild Semiconductor products are manufactured, assembled and tested under ISO9000 and QS9000 quality systems certification.

Typical Characteristics

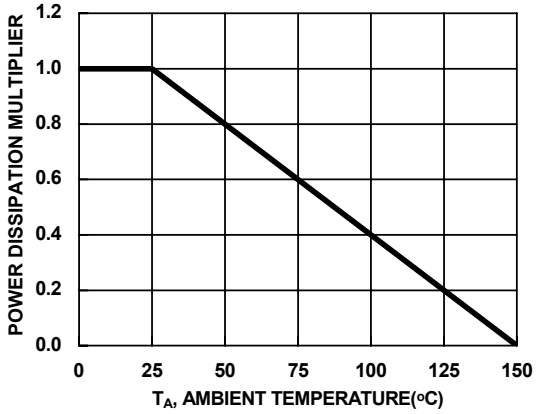


Figure 1. Normalized Power Dissipation vs Ambient Temperature

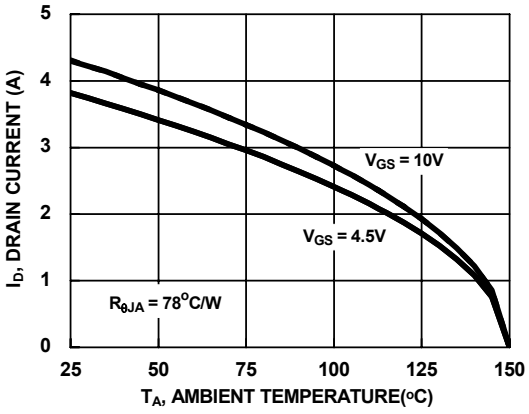


Figure 2. Maximum Continuous Drain Current vs Ambient Temperature

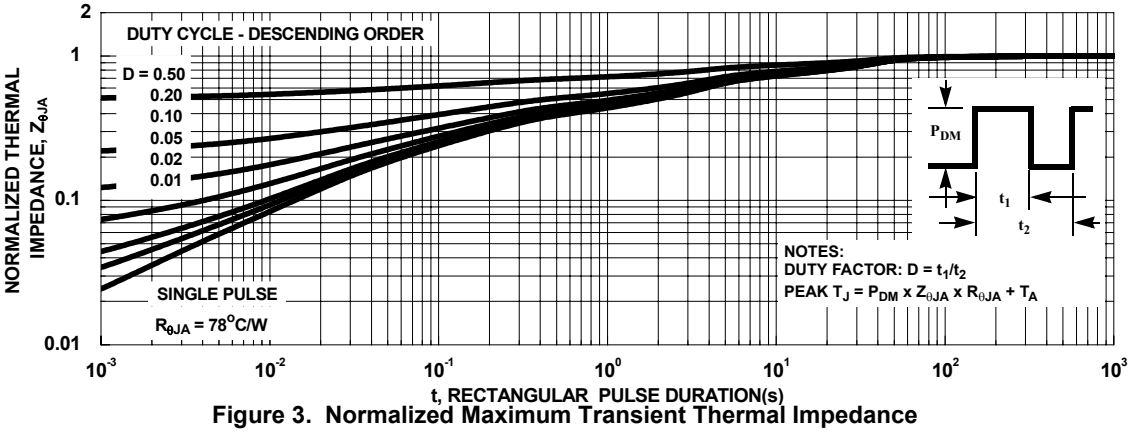


Figure 3. Normalized Maximum Transient Thermal Impedance

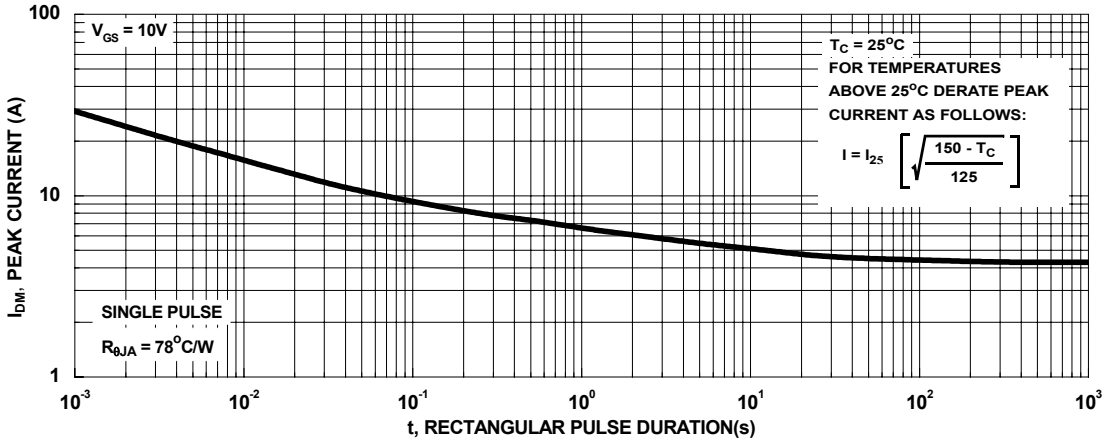


Figure 4. Peak Current Capability

Typical Characteristics

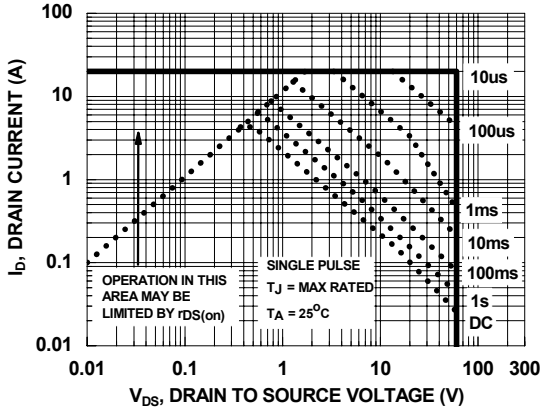


Figure 5. Forward Bias Safe Operating Area

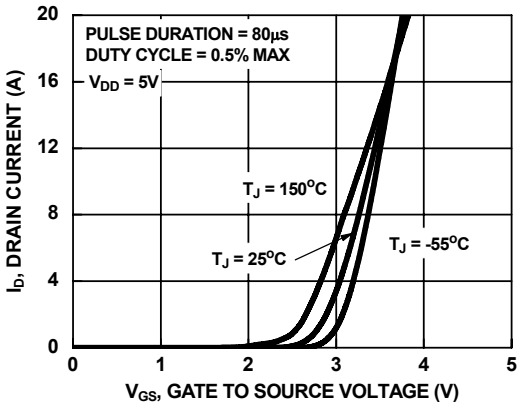


Figure 6. Transfer Characteristics

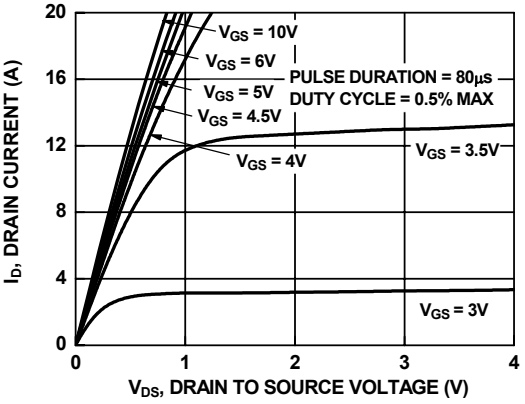


Figure 7. Saturation Characteristics

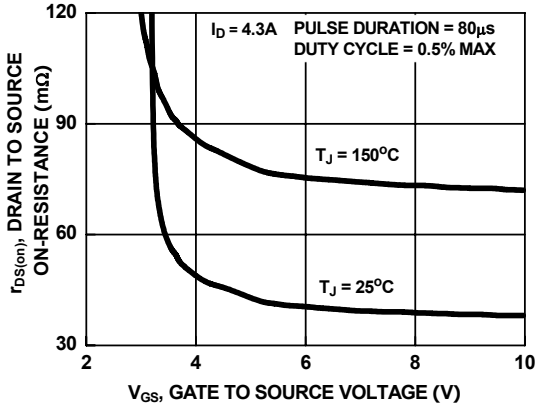


Figure 8. Drain to Source On-Resistance Variation vs Gate to Source Voltage

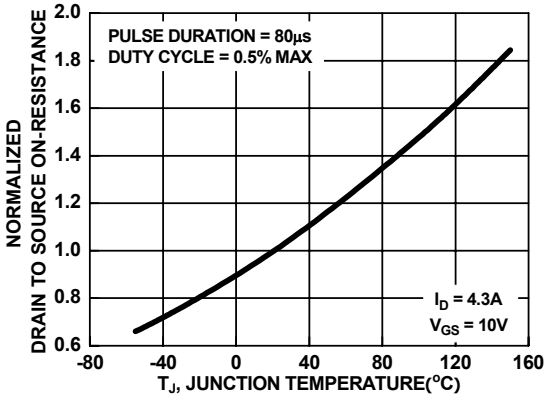


Figure 9. Normalized Drain to Source On Resistance vs Junction Temperature

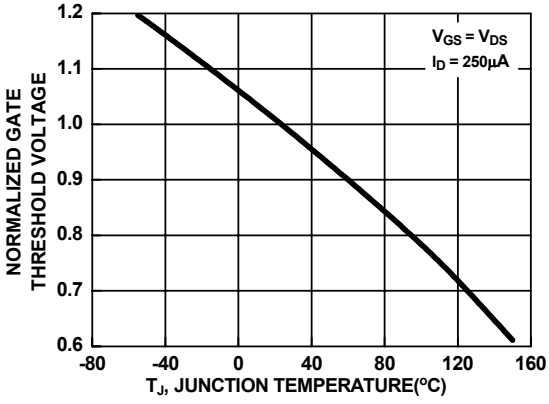


Figure 10. Normalized Gate Threshold Voltage vs Junction Temperature

Typical Characteristics

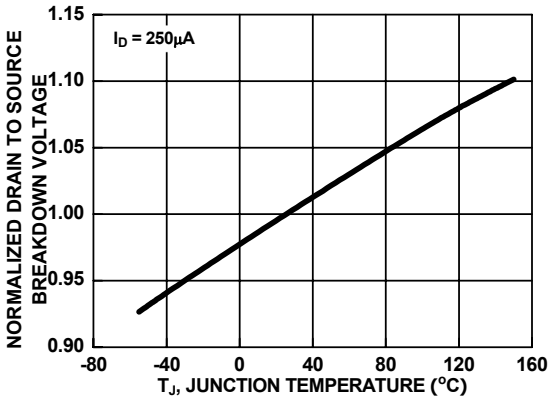


Figure 11. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

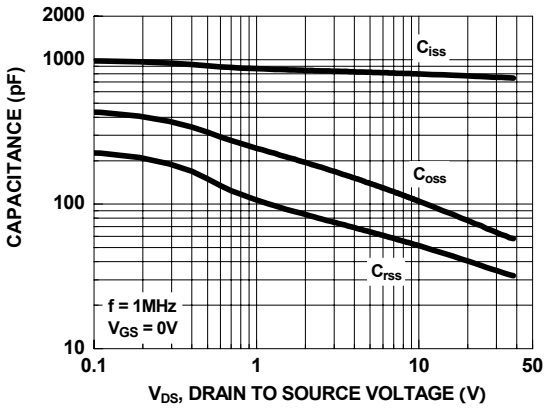


Figure 12. Capacitance vs Drain to Source Voltage

Figure 14.

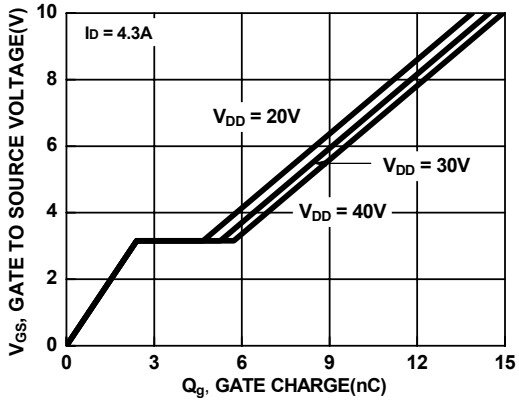


Figure 13. Gate Charge vs Gate to Source Voltage

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.

Build it Now™
CorePLUS™
CorePOWER™
CROSSVOLT™
CTL™
Current Transfer Logic™
EcoSPARK®
EfficentMax™
EZSWITCH™ *
™
®
Fairchild®
Fairchild Semiconductor®
FACT Quiet Series™
FACT®
FAST®
FastvCore™
FlashWriter® *
FPS™
F-PFS™
FRFET®
Global Power Resource^{SM}
Green FPS™
Green FPS™ e-Series™
GTO™
IntelliMAX™
ISOPLANAR™
MegaBuck™
MICROCOUPLER™
MicroFET™
MicroPak™
MillerDrive™
MotionMax™
Motion-SPM™
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™
SmartMax™
SMART START™
SPM®
STEALTH™
SuperFET™
SuperSOT™-3
SuperSOT™-6
SuperSOT™-8
SupreMOS™
SyncFET™
SYSTEM GENERAL ®
The Power Franchise®
the power franchise
TinyBoost™
TinyBuck™
TinyLogic®
TINYOPTO™
TinyPower™
TinyPWM™
TinyWire™
µSerDes™
SerDes™
UHC®
Ultra FRFET™
UniFET™
VCX™
VisualMax™
XS™

* EZSWITCH™ and FlashWriter® are 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. Farichild'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. Farichild strongly encourages customers to purchase Farichild 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 Farichild'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. Farichild 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. I37