Is Now Part of

ON Semiconductor®

To learn more about ON Semiconductor, please visit our website at www.onsemi.com

Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild_questions@onsemi.com.

FAIRCHILD SEMICONDUCTOR®

October 2007

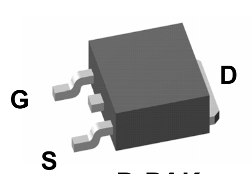
FDD5810
N-Channel Logic Level Trench® MOSFET
60V, 36A, 27mΩ

Features

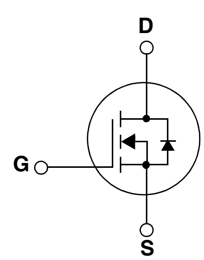
- $R_{DS(ON)}$ = 22mΩ (Typ.), V_{GS} = 5V, I_D = 29A
- $Q_{g(5)}$ = 13nC (Typ.), V_{GS} = 5V
- Low Miller Charge
- Low Q_{rr} Body Diode
- UIS Capability (Single Pulse / Repetitive Pulse)
- Qualified to AEC Q101
- RoHS Compliant

Applications

- Motor / Body Load Control
- ABS Systems
- Powertrain Management
- Injection System
- DC-DC converters and Off-line UPS
- Distributed Power Architecture and VRMs
- Primary Switch for 12V and 24V systems



D-PAK
(TO-252)



Absolute Maximum Ratings $T_C = 25°C$ 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)	37	A
	Drain Current Continuous (V_{GS} = 5V)	33	A
	Continuous ($T_A = 25^oC$, V_{GS} = 10V, with $R_{\theta JA} = 52^oC/W$)	7.4	A
	Pulsed	Figure 4	A
E_{AS}	Single Pulse Avalanche Energy (Note 1)	45	mJ
P_D	Power Dissipation	72	W
	Derate above 25^oC	0.48	$W/^oC$
T_J, T_{STG}	Operating and Storage Temperature	-55 to 175	^oC

Thermal Characteristics

$R_{\theta JC}$	Maximum Thermal resistance Junction to Case TO-252	2.1	$^oC/W$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient TO-252, $1in^2$ copper pad area	52	$^oC/W$

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDD5810	FDD5810	TO-252AA	330mm	16mm	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	60	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 48V	-	-	1	μA
		V_{GS} = 0V, $T_C = 150^oC$	-	-	250	
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±20V	-	-	±100	nA
On Characteristics						
$V_{GS(TH)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 250\mu A$	1	1.6	2	V
$R_{DS(ON)}$	Drain to Source On Resistance	I_D = 32A, V_{GS} = 10V	-	18	22	mΩ
		I_D = 29A, V_{GS} = 5V	-	22	27	
		I_D = 32A, V_{GS} = 10V, $T_J = 175^oC$	-	43	53	
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1MHz	-	1420	1890	pF
C_{oss}	Output Capacitance		-	150	200	pF
C_{rss}	Reverse Transfer Capacitance		-	65	100	pF
R_G	Gate Resistance	f = 1MHz	-	3.5	-	Ω
Q_g	Total Gate Charge at 10V	V_{GS} = 0V to 10V; V_{DD} = 30V, I_D = 35A	-	24	34	nC
Q_g	Total Gate Charge at 5V	V_{GS} = 0V to 5V	-	13	18	nC
$Q_{g(th)}$	Threshold Gate Charge	V_{GS} = 0V to 1V	-	1.3	-	nC
Q_{gs}	Gate to Source Gate Charge		-	4.0	-	nC
Q_{gs2}	Gate Charge Threshold to Plateau		-	2.7	-	nC
Q_{gd}	Gate to Drain "Miller" Charge		-	5.0	-	nC

Switching Characteristics

t_{on}	Turn-On Time	V_{DD} = 30V, I_D = 35A V_{GS} = 5V, R_{GS} = 11Ω	-	-	130	ns
$t_{d(on)}$	Turn-On Delay Time		-	12	-	ns
t_r	Rise Time		-	75	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	26	-	ns
t_f	Fall Time		-	34	-	ns
t_{off}	Turn-Off Time		-	-	90	ns

Drain-Source Diode Characteristics

V_{SD}	Source to Drain Diode Voltage	I_{SD} = 32A	-	-	1.25	V
		I_{SD} = 16A	-	-	1.0	V
t_{rr}	Reverse Recovery Time	I_F = 35A, di/dt = 100A/μs	-	-	39	ns
Q_{rr}	Reverse Recovery Charge	I_F = 35A, di/dt = 100A/μs	-	-	35	nC

Notes:
1: Starting T_J = 25°C, L = 110μH, I_{AS} = 28A, V_{DD} = 54V, V_{GS} = 10V.

Typical Characteristics T_J = 25°C unless otherwise noted

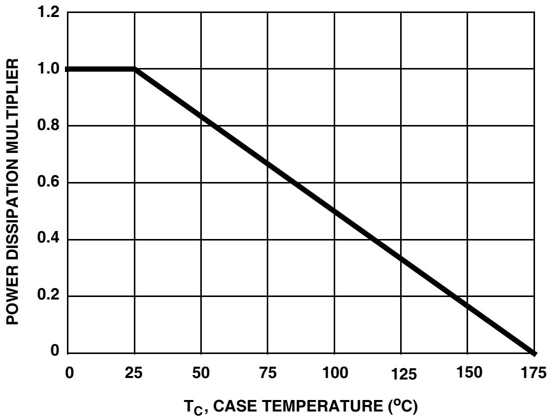


Figure 1. Normalized Power Dissipation vs Case Temperature

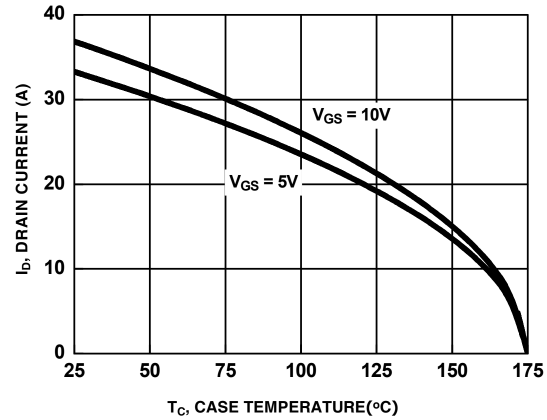


Figure 2. Maximum Continuous Drain Current vs Case Temperature

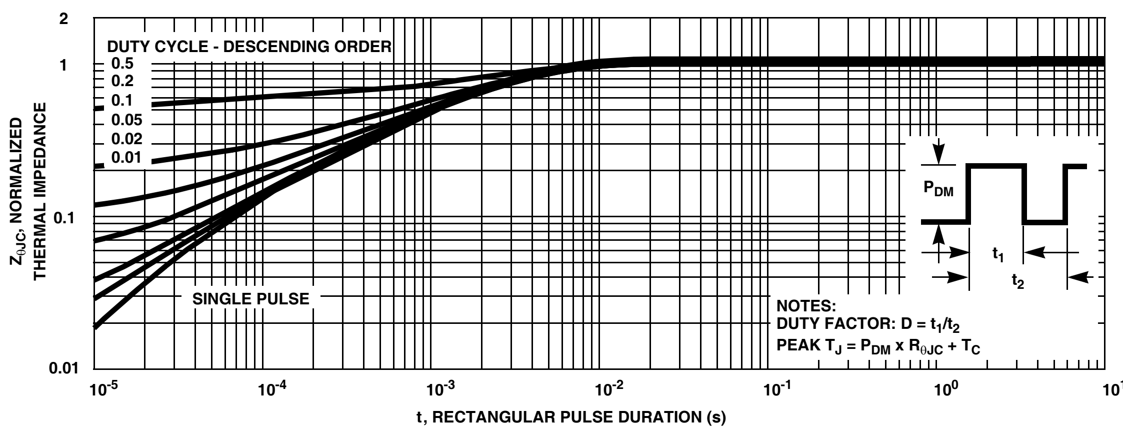


Figure 3. Normalized Maximum Transient Thermal Impedance

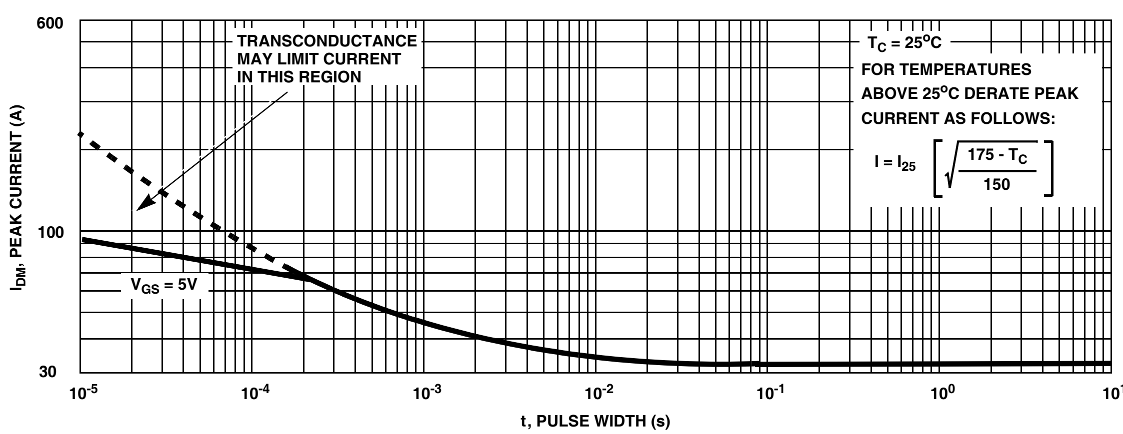


Figure 4. Peak Current Capability

Typical Characteristics T_J = 25°C unless otherwise noted

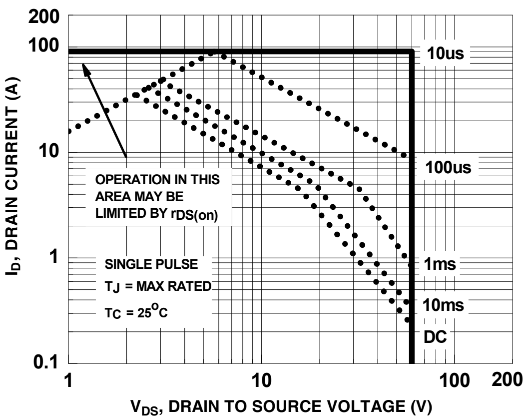
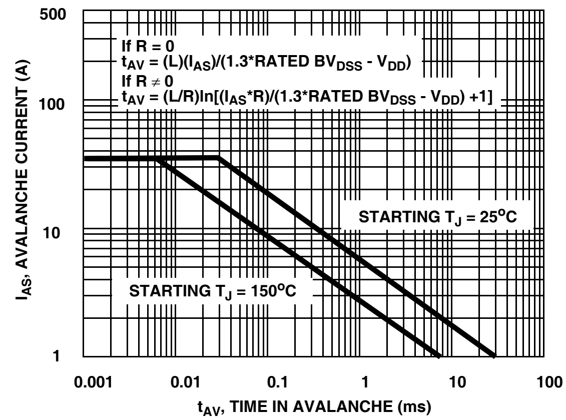


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to Fairchild Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching Capability

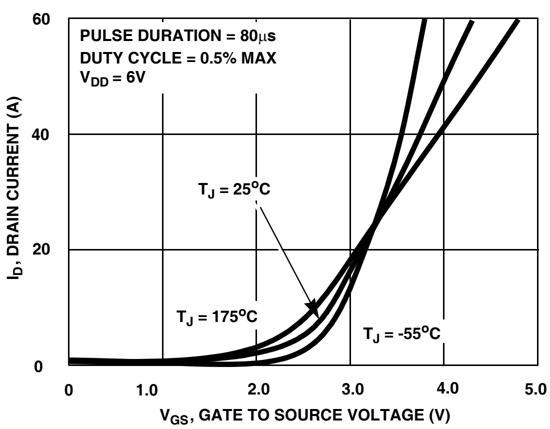


Figure 7. Transfer Characteristics

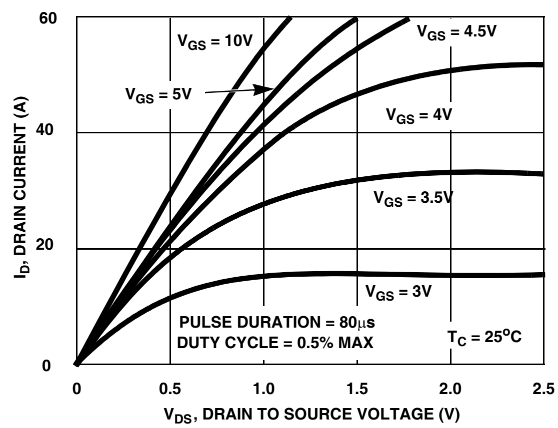


Figure 8. Saturation Characteristics

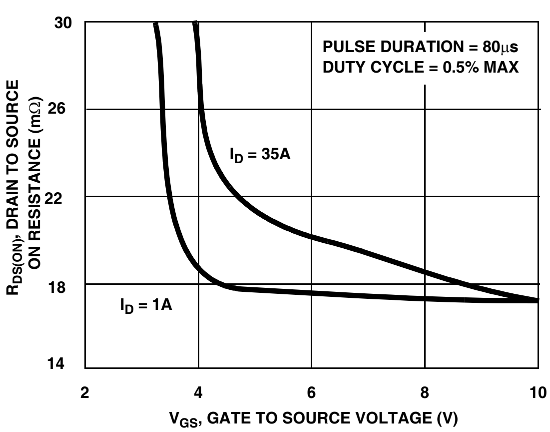


Figure 9. Drain to Source On Resistance vs Gate Voltage and Drain Current

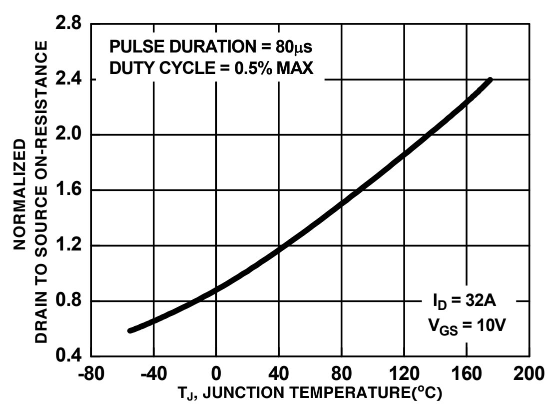


Figure 10. Normalized Drain to Source On Resistance vs Junction Temperature

Typical Characteristics T_J = 25°C unless otherwise noted

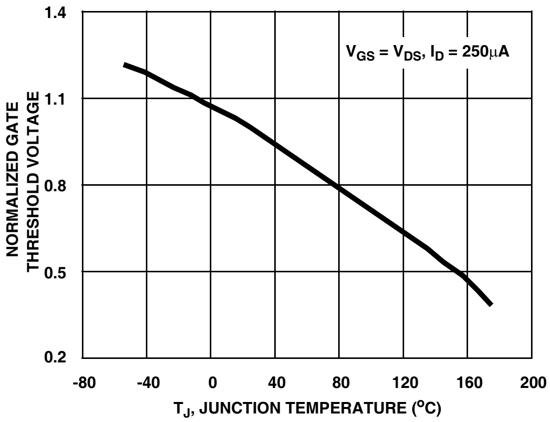


Figure 11. Normalized Gate Threshold Voltage vs Junction Temperature

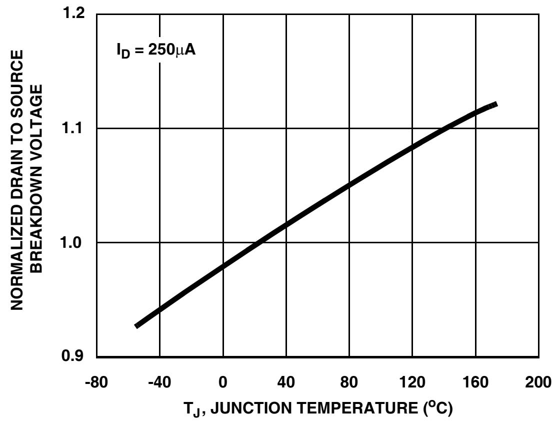


Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

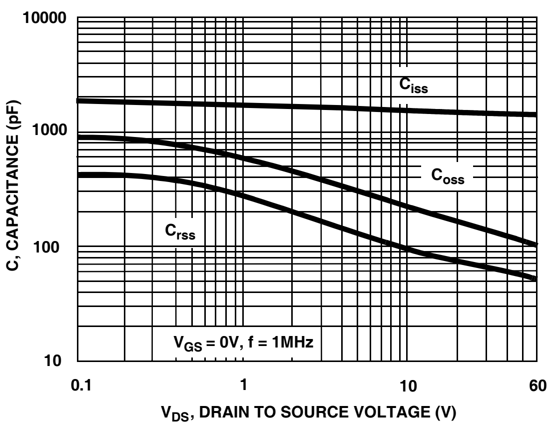


Figure 13. Capacitance vs Drain to Source Voltage

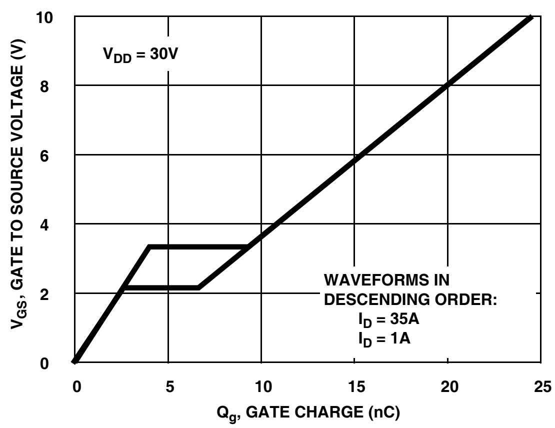


Figure 14. Gate Charge Waveforms for Constant Gate Current

FAIRCHILD SEMICONDUCTOR®

TRADEMARKS

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

ACEx®
Build it Now™
CorePLUS™
CROSSVOLT™
CTL™
Current Transfer Logic™
EcoSPARK®
®
Fairchild®
Fairchild Semiconductor®
FACT Quiet Series™
FACT®
FAST®
FastvCore™
FPS™
FRFET®
Global Power Resource℠
Green FPS™
Green FPS™ e-Series™
GTO™
i-Lo™
IntelliMAX™
ISOPLANAR™
MegaBuck™
MICROCOUPLER™
MicroFET™
MicroPak™
MillerDrive™
Motion-SPM™
OPTOLOGIC®
OPTOPLANAR®
®
PDP-SPM™
Power220®
Power247®
POWEREDGE®
Power-SPM™
PowerTrench®
Programmable Active Droop™
QFET®
QS™
QT Optoelectronics™
Quiet Series™
RapidConfigure™
SMART START™
SPM®
STEALTH™
SuperFET™
SuperSOT™-3
SuperSOT™-6
SuperSOT™-8
SyncFET™
The Power Franchise®
the power franchise
TinyBoost™
TinyBuck™
TinyLogic®
TINYOPTO™
TinyPower™
TinyPWM™
TinyWire™
µSerDes™
UHC®
UniFET™
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. 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.

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; 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.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild Semiconductor. The datasheet is printed for reference information only.

Rev. I31

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81−3−5817−1050

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative