May 2014

FDBL9406_F085

N-Channel PowerTrench® MOSFET

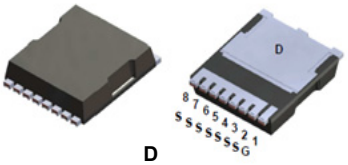
40 V, 240 A, 1.2 mΩ

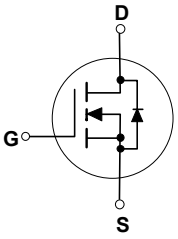
Features

- Typical $R_{DS(on)}$ = 0.9 mΩ at V_{GS} = 10V, I_D = 80 A
- Typical $Q_{g(tot)}$ = 90 nC at V_{GS} = 10V, I_D = 80 A
- UIS Capability
- RoHS Compliant
- Qualified to AEC Q101

Applications

- Automotive Engine Control
- PowerTrain Management
- Solenoid and Motor Drivers
- Integrated Starter/Alternator
- Primary Switch for 12V Systems





For current package drawing, please refer to the Fairchild web-site at http://www.fairchildsemi.com/dwg/PS/PSOF08A.pdf.

MOSFET Maximum Ratings T_J = 25°C unless otherwise noted.

Symbol	Parameter		Ratings	Units
V_{DSS}	Drain-to-Source Voltage		40	V
V_{GS}	Gate-to-Source Voltage		±20	V
I_D	Drain Current - Continuous (V_{GS}=10) (Note 1)	T_C = 25°C	240	A
	Pulsed Drain Current	T_C = 25°C	See Figure 4	
E_{AS}	Single Pulse Avalanche Energy	(Note 2)	316	mJ
P_D	Power Dissipation		300	W
	Derate Above 25°C		2.0	W/°C
T_J, T_{STG}	Operating and Storage Temperature		-55 to + 175	°C
$R_{\theta JC}$	Thermal Resistance, Junction to Case		0.5	°C/W
$R_{\theta JA}$	Maximum Thermal Resistance, Junction to Ambient	(Note 3)	43	°C/W

Notes:
1: Current is limited by bondwire configuration.
2: Starting T_J = 25°C, L = 0.1mH, I_{AS} = 79.5A, V_{DD} = 40V during inductor charging and V_{DD} = 0V during time in avalanche.
3: $R_{\theta JA}$ 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 board design. The maximum rating presented here is based on mounting on a 1 in^2 pad of 2oz copper.

Package Marking and Ordering Information

Device Marking	Device	Package			
FDBL9406	FDBL9406_F085	MO-299A	-	-	-

©2014 Fairchild Semiconductor Corporation

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 PA, V_{GS} = 0V	40	-	-	V
I_{DSS}	Drain-to-Source Leakage Current	V_{DS}=40V, V_{GS} = 0V, T_J = 25°C	-	-	1	PA
		V_{DS}=40V, V_{GS} = 0V, T_J = 175°C (Note 4)	-	-	1	mA
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 PA	2.0	3.2	4.0	V
$R_{DS(on)}$	Drain to Source On Resistance	I_D = 80A, V_{GS}= 10V, T_J = 25°C	-	0.90	1.20	m :
		I_D = 80A, V_{GS}= 10V, T_J = 175°C (Note 4)	-	1.64	1.86	m :
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1MHz	-	7735	-	pF
C_{oss}	Output Capacitance		-	2160	-	pF
C_{rss}	Reverse Transfer Capacitance		-	129	-	pF
R_g	Gate Resistance	f = 1MHz	-	2.5	-	:
$Q_{g(ToT)}$	Total Gate Charge at 10V	V_{GS} = 0 to 10V, V_{DD} = 32V, I_D = 80A	-	90	107	nC
$Q_{g(th)}$	Threshold Gate Charge	V_{GS} = 0 to 2V, V_{DD} = 32V, I_D = 80A	-	13.5	15.5	nC
Q_{gs}	Gate-to-Source Gate Charge	V_{DD} = 32V, I_D = 80A	-	43	-	nC
Q_{gd}	Gate-to-Drain “Miller“ Charge	V_{DD} = 32V, I_D = 80A	-	10	-	nC
Switching Characteristics						
t_{on}	Turn-On Time	V_{DD} = 20V, I_D = 80A, V_{GS} = 10V, R_{GEN} = 6 :	-	-	102	ns
$t_{d(on)}$	Turn-On Delay		-	33	-	ns
t_r	Rise Time		-	40	-	ns
$t_{d(off)}$	Turn-Off Delay		-	47	-	ns
t_f	Fall Time		-	23	-	ns
t_{off}	Turn-Off Time		-	-	91	ns
Drain-Source Diode Characteristics						
V_{SD}	Source-to-Drain Diode Voltage	I_{SD} =80A, V_{GS} = 0V	-	-	1.25	V
		I_{SD} = 40A, V_{GS} = 0V	-	-	1.2	V
t_{rr}	Reverse-Recovery Time	I_F = 80A, dI_{SD}/dt = 100A/ Ps, V_{DD}=32V	-	91	107	ns
Q_{rr}	Reverse-Recovery Charge		-	128	167	nC

Note:

4: The maximum value is specified by design at T_J = 175°C. Product is not tested to this condition in production.

Typical Characteristics

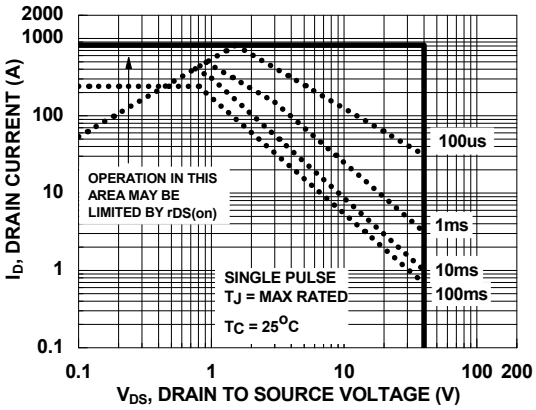
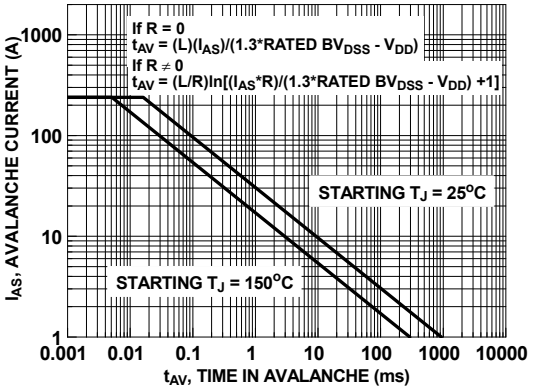


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to Fairchild Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching Capability

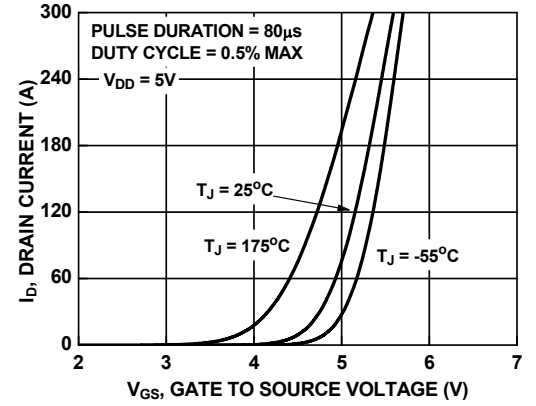


Figure 7. Transfer Characteristics

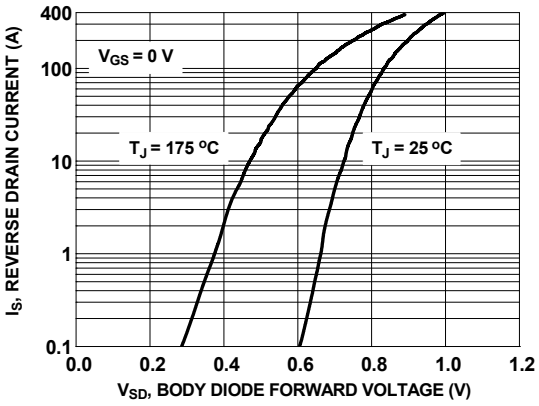


Figure 8. Forward Diode Characteristics

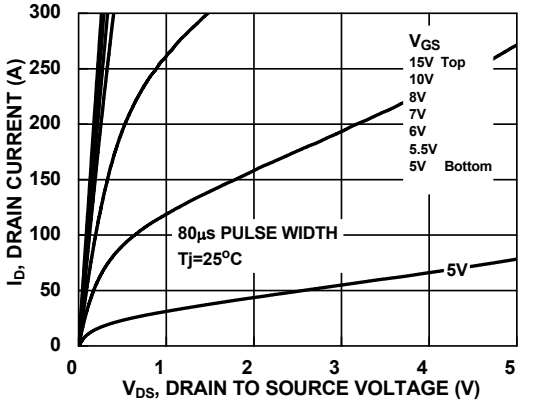


Figure 9. Saturation Characteristics

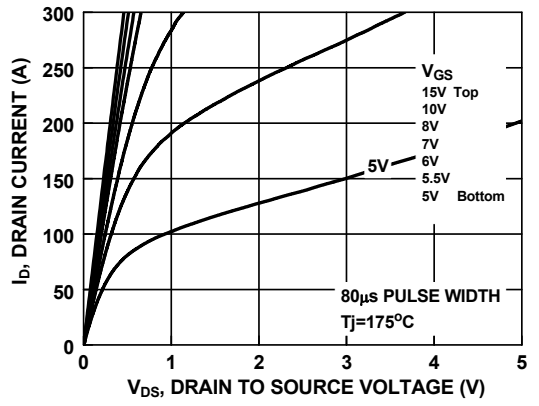


Figure 10. Saturation Characteristics

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™
AX-CAP®*
BitSiC™
Build it Now™
CorePLUS™
CorePOWER™
CROSSVOLT™
CTL™
Current Transfer Logic™
DEUXPEED®
Dual Cool™
EcoSPARK®
EfficentMax™
ESBC™
F®
Fairchild®
Fairchild Semiconductor®
FACT Quiet Series™
FACT®
FAST®
FastvCore™
FETBench™
FPS™
F-PFS™
FRFET®
Global Power Resource℠
GreenBridge™
Green FPS™
Green FPS™ e-Series™
G*max*™
GTO™
IntelliMAX™
ISOPLANAR™
Marking Small Speakers Sound Louder and Better™
MegaBuck™
MICROCOUPLER™
MicroFET™
MicroPak™
MicroPak2™
MillerDrive™
MotionMax™
mWSaver®
OptoHiT™
OPTOLOGIC®
OPTOPLANAR®
®
PowerTrench®
PowerXS™
Programmable Active Droop™
QFET®
QS™
Quiet Series™
RapidConfigure™
™
Saving our world, 1mW/W/kW at a time™
SignalWise™
SmartMax™
SMART START™
Solutions for Your Success™
SPM®
STEALTH™
SuperFET®
SuperSOT™-3
SuperSOT™-6
SuperSOT™-8
SupreMOS®
SyncFET™
Sync-Lock™
SYSTEM GENERAL ®*
TinyBoost®
TinyBuck®
TinyCalc™
TinyLogic®
TINYOPTO™
TinyPower™
TinyPWM™
TinyWire™
TranSiC™
TriFault Detect™
TRUECURRENT®*
μSerDes™
SerDes™
UHC®
Ultra FRFET™
UniFET™
VCX™
VisualMax™
VoltagePlus™
XS™
仙童 ™

*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 here in:

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. I68