FAIRCHILD SEMICONDUCTOR®

October 2006

FDMB3800N
Dual N-Channel PowerTrench® MOSFET
30V, 4.8A, 40mΩ

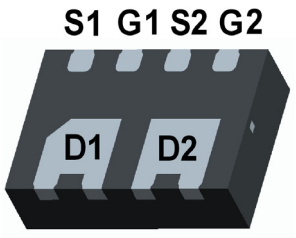
Features

- Max $r_{DS(on)}$ = 40mΩ at V_{GS} = 10V, I_D = 4.8A
- Max $r_{DS(on)}$ = 51mΩ at V_{GS} = 4.5V, I_D = 4.3A
- Fast switching speed
- Low gate Charge
- High performance trench technology for extremely low $r_{DS(on)}$
- High power and current handling capability.
- RoHS Compliant

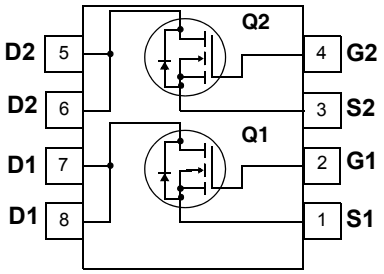
General Description

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.



MicroFET 3X1.9



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				±20	V
I_D	Drain Current	-Continuous	T_A = 25°C	(Note 1a)	4.8	A
		-Pulsed			9	
P_D	Power Dissipation		T_A = 25°C	Note 1a)	1.6	W
	Power Dissipation		T_A = 25°C	(Note 1b)	0.75	
T_J, T_{STG}	Operating and Storage Junction Temperature Range				-55 to +150	°C

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1a)	80	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1b)	165	

Package Marking and Ordering Information

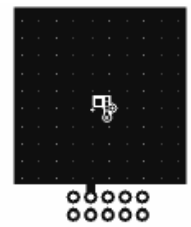
Device Marking	Device	Package	Reel Size	Tape Width	Quantity
3800	FDMB3800N	MicroFET3X1.9	7”	8mm	3000 units

Electrical Characteristics T_J = 25°C unless otherwise noted

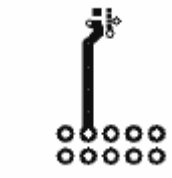
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250μA, V_{GS} = 0V	30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250μA, referenced to 25°C		24		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 24V, V_{GS} = 0V			1	μA
		V_{DS} = 24V, V_{GS} = 0V, T_J = 55°C			10	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±20V, V_{DS} = 0V			±100	nA
On Characteristics						
$V_{GS(th)}$	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		-4		mV/°C
$r_{DS(on)}$	Drain to Source On Resistance	V_{GS} = 10V, I_D = 4.8A		32	40	mΩ
		V_{GS} = 4.5V, I_D = 4.3A		41	51	mΩ
		V_{GS} = 10V, I_D = 4.8A, T_J = 125°C		43	61	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 5V, I_D = 4.8A		14		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} =15V, V_{GS} = 0V, f = 1MHz		350	465	pF
C_{oss}	Output Capacitance			90	120	pF
C_{rss}	Reverse Transfer Capacitance			40	60	pF
R_g	Gate Resistance	f = 1MHz		3		Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 15V, I_D = 1A, V_{GS} = 10V, R_{GEN} = 6Ω		8	16	ns
t_r	Rise Time			5	10	ns
$t_{d(off)}$	Turn-Off Delay Time			21	34	ns
t_f	Fall Time			2	10	ns
$Q_{g(TOT)}$	Total Gate Charge at 5V	V_{GS} = 0V to 5V, V_{DD} = 15V, I_D = 7.5A		4	5.6	nC
Q_{gs}	Gate to Source Gate Charge			1.0		nC
Q_{gd}	Gate to Drain “Miller” Charge			1.5		nC
Drain-Source Diode Characteristics						
I_S	Maximum Continuous Drain - Source Diode Forward Current				1.25	A
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0V, I_S = 1.25A (Note 2)		0.8	1.2	V
t_{rr}	Reverse Recovery Time	I_F = 4.8A, di/dt = 100A/μs		17		ns
Q_{rr}	Reverse Recovery Charge			7		nC

Notes:

1: $R_{\theta JA}$ is determined with the device mounted on a 1in^2 pad 2 oz copper pad on a 1.5 x 1.5 in. board of FR-4 material. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a. 80°C/W when mounted on a 1 in^2 pad of 2 oz copper



b. 165°C/W when mounted on a minimum pad of 2 oz copper

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

Typical Characteristics T_J = 25°C unless otherwise noted

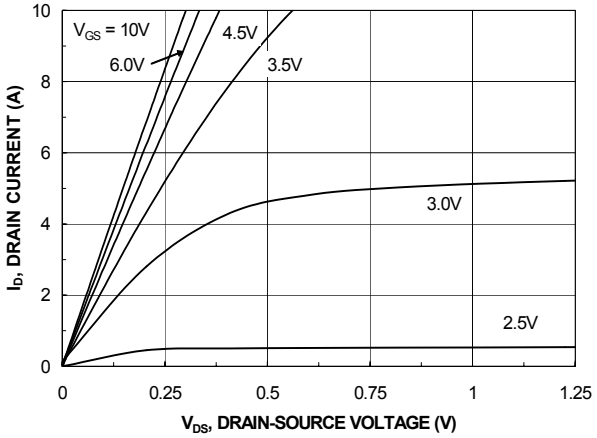


Figure 1. On Region Characteristics

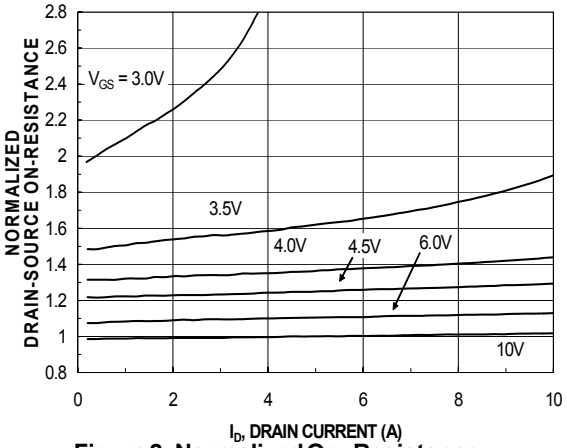


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

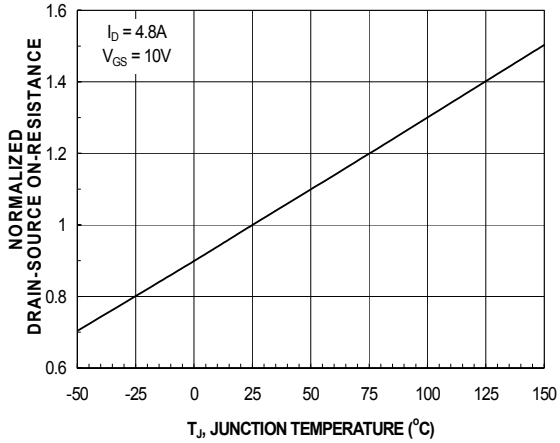


Figure 3. Normalized On-Resistance vs Junction Temperature

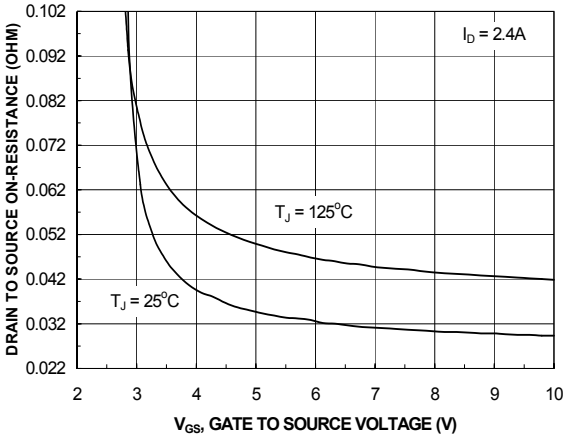


Figure 4. On-Resistance vs Gate to Source Voltage

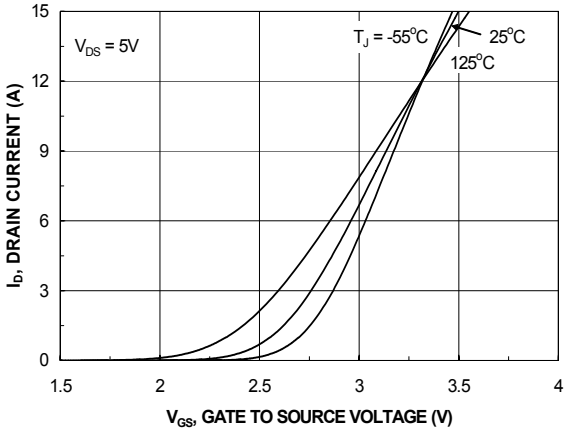


Figure 5. Transfer Characteristics

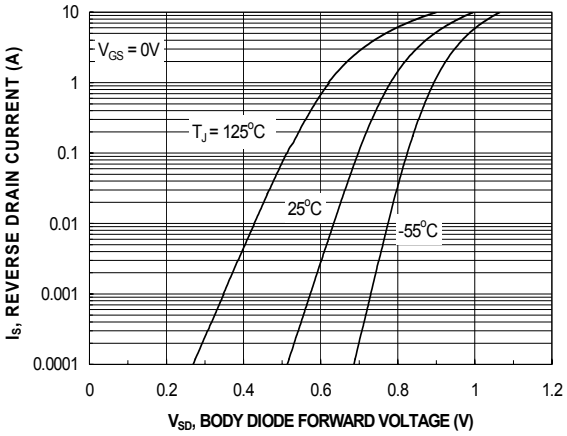


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics T_J = 25°C unless otherwise noted

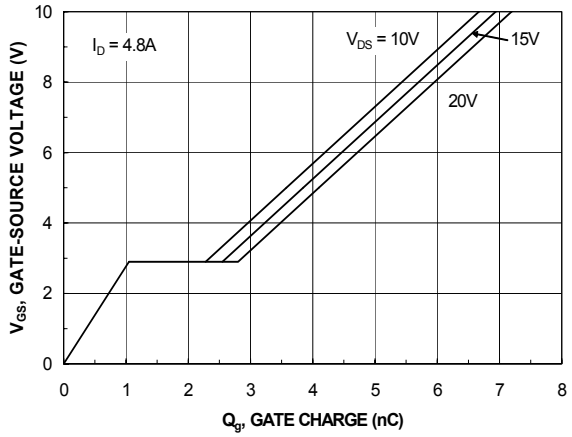


Figure 7. Gate Charge Characteristics

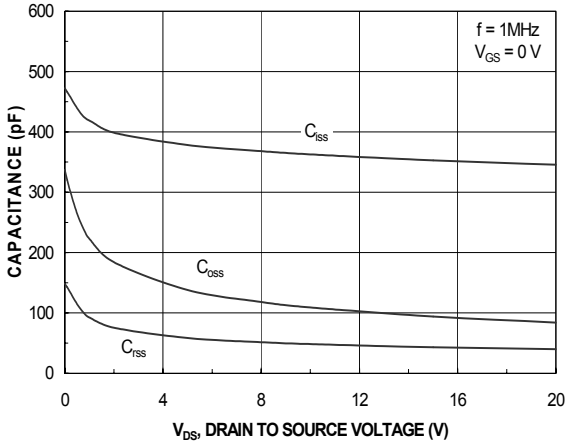


Figure 8. Capacitance vs Drain to Source Voltage

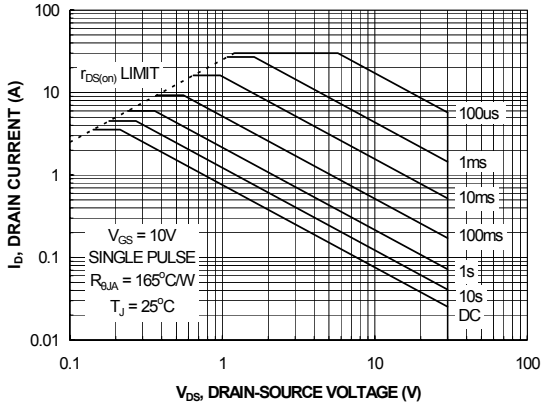


Figure 9. Forward Bias Safe Operating Area

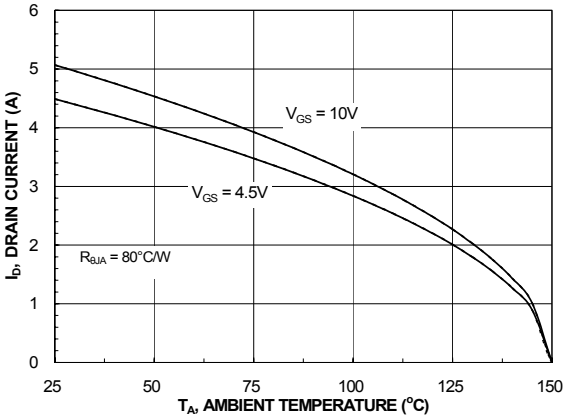


Figure 10. Maximum Continuous Drain Current vs Ambient Temperature

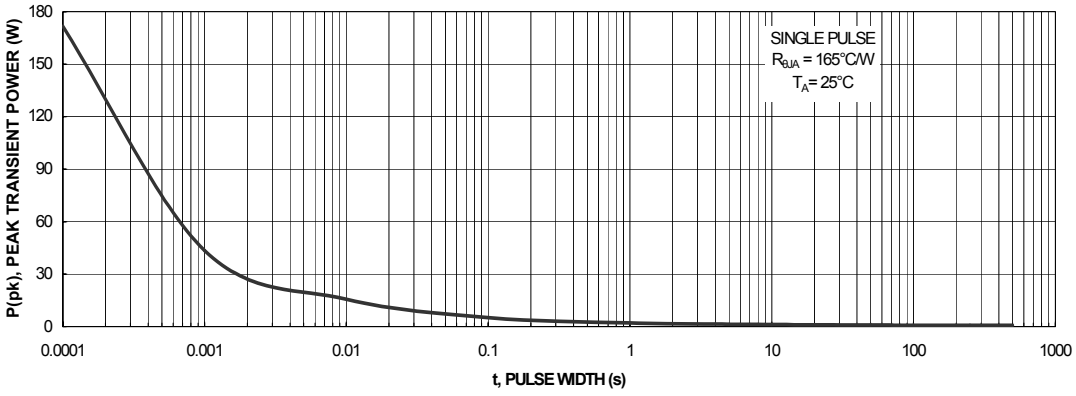


Figure 11. Single Pulse Maximum Power Dissipation

Typical Characteristics T_J = 25°C unless otherwise noted

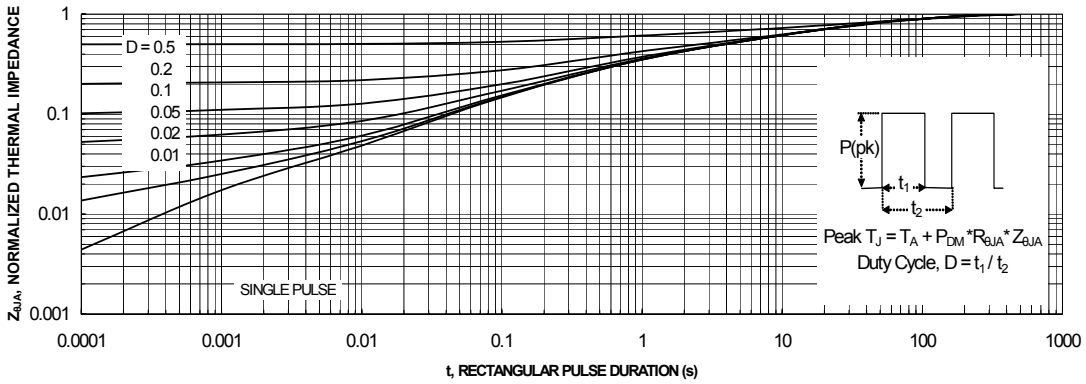
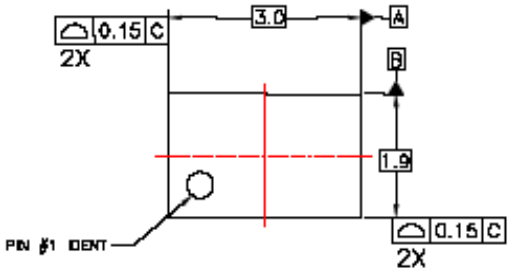
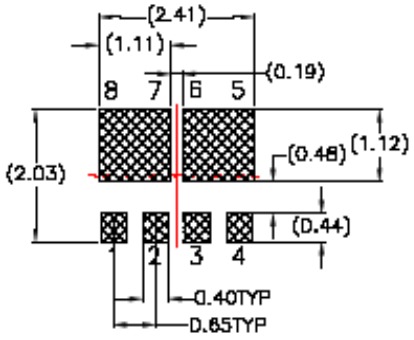


Figure 12. Transient Thermal Response Curve

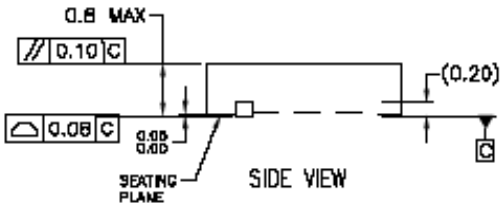
Dimensional Outline and Pad Layout



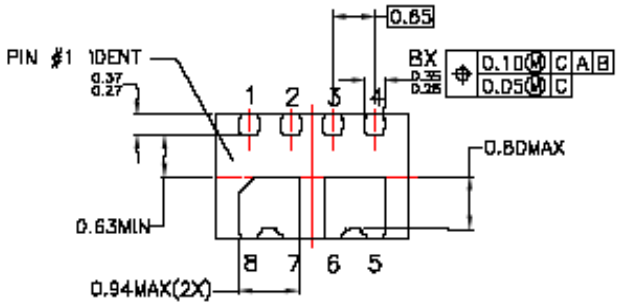
TOP VIEW



RECOMMENDED LAND PATTERN



SIDE VIEW



BOTTOM VIEW

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.

ACEx™	FACT Quiet Series™	OCX™	SILENT SWITCHER®	UniFET™
ActiveArray™	GlobalOptoisolator™	OCXPro™	SMART START™	UltraFET®
Bottomless™	GTO™	OPTOLOGIC®	SPM™	VCX™
Build it Now™	HiSeC™	OPTOPLANAR™	Stealth™	Wire™
CoolFET™	I^2C™	PACMAN™	SuperFET™	
CROSSVOLT™	*i-Lo*™	POP™	SuperSOT™-3	
DOME™	ImpliedDisconnect™	Power247™	SuperSOT™-6	
EcoSPARK™	IntelliMAX™	PowerEdge™	SuperSOT™-8	
E^2CMOS™	ISOPLANAR™	PowerSaver™	SyncFET™	
EnSigna™	LittleFET™	PowerTrench®	TCM™	
FACT™	MICROCOUPLER™	QFET®	TinyBoost™	
FAST®	MicroFET™	QS™	TinyBuck™	
FASTr™	MicroPak™	QT Optoelectronics™	TinyPWM™	
FPS™	MICROWIRE™	Quiet Series™	TinyPower™	
FRFET™	MSX™	RapidConfigure™	TinyLogic®	
	MSXPro™	RapidConnect™	TINYOPTO™	
Across the board. Around the world.™		µSerDes™	TruTranslation™	
The Power Franchise®		ScalarPump™	UHC™	
Programmable Active Droop™				

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 semiconductor. The datasheet is printed for reference information only.

Rev. I20