

FDMB3800N

Dual N-Channel PowerTrench® MOSFET

4.8A, 30V, 40mΩ

General Description

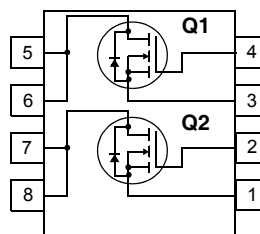
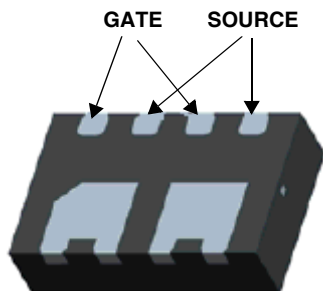
These N-Channel Logic Level MOSFETs are produced using Fairchild Semiconductor's advanced PowerTrench process that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

These devices are well suited for low voltage and battery powered applications where low in-line power loss and fast switching are required.



Features

- $R_{DS(ON)} = 40\text{ m}\Omega @ V_{GS} = 10\text{ V}$
 $R_{DS(ON)} = 51\text{ m}\Omega @ V_{GS} = 4.5\text{ V}$
- Fast switching speed
- Low gate charge
- High performance trench technology for extremely low $R_{DS(ON)}$
- High power and current handling capability.
- RoHS Compliant



Absolute Maximum Ratings $T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DSS}	Drain-Source Voltage	30	V
V_{GSS}	Gate-Source Voltage	± 20	V
I_D	Drain Current -Continuous (Note 1a)	4.8	A
	-Pulsed	9	
P_D	Power dissipation for Single Operation (Note 1a)	1.6	W
	Power dissipation for Single Operation (Note 1b)	0.75	
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ\text{C}$

Thermal Characteristics

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

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape Width	Quantity
3800	FDMB3800N	7inch	8mm	3000 units

Electrical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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Off Characteristics

BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	30	-	-	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\mu A$, Referenced to 25°C	-	24	-	mV/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 24V, V_{GS} = 0V$ $V_{DS} = 24V, V_{GS} = 0V$, $T_J = 55^\circ\text{C}$	-	-	1 10	μA
I_{GSS}	Gate-Body Leakage,	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	± 100	nA

On Characteristics (Note 2)

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	1	1.9	3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = 250\mu A$, Referenced to 25°C	-	-4	-	mV/ $^\circ\text{C}$
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10V, I_D = 4.8A$ $V_{GS} = 4.5V, I_D = 4.3A$ $V_{GS} = 10V, I_D = 4.8A$ $T_J = 125^\circ\text{C}$	-	32 41 43	40 51 61	m Ω
$I_{D(on)}$	On-State Drain Current	$V_{GS} = 10V, V_{DS} = 5V$	10	-	-	A
g_{FS}	Forward Transconductance	$V_{DS} = 5V, I_D = 4.8A$	-	14	-	S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 15V, V_{GS} = 0V$, $f = 1.0\text{MHz}$	-	350	465	pF
C_{oss}	Output Capacitance		-	90	120	pF
C_{rss}	Reverse Transfer Capacitance		-	40	60	pF
R_G	Gate Resistance	$f = 1.0\text{MHz}$	-	3	-	Ω

Switching Characteristics (Note 2)

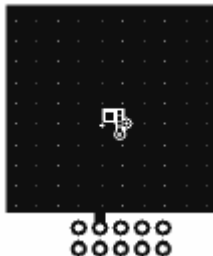
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 15V, I_D = 1A$ $V_{GS} = 10V, R_{GEN} = 6\Omega$	-	8	16	ns
t_r	Turn-On Rise Time		-	5	10	ns
$t_{d(off)}$	Turn-Off Delay Time		-	21	34	ns
t_f	Turn-Off Fall Time		-	2	10	ns
Q_g	Total Gate Charge	$V_{DS} = 15V, I_D = 7.5A$, $V_{GS} = 5V$	-	4	5.6	nC
Q_{gs}	Gate-Source Charge		-	1.0	-	nC
Q_{gd}	Gate-Drain Charge		-	1.5	-	nC

Drain-Source Diode Characteristics and Maximum Ratings

I_S	Maximum Continuous Drain-Source Diode Forward Current	-	-	1.25	A	
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0V, I_S = 1.25A$ (Note 2)	-	0.8	1.2	V
t_{rr}	Diode Reverse Recovery Time	$I_F = 4.8A, dI_F/dt = 100A/\mu s$	-	-	22	ns
Q_{rr}	Diode Reverse Recovery Charge		-	-	9	nC

Notes:

- $R_{\theta JA}$ 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 $R_{\theta CA}$ is determined by the user's board design.
- Pulse Test: Pulse Width < 300 μs , Duty Cycle < 2.0%



a) 80°C/W when mounted on a 1in² pad of 2 oz copper



b) 165°C/W when mounted on a minimum pad of 2 oz copper
Scale 1: 1 on letter size paper

Typical Characteristics

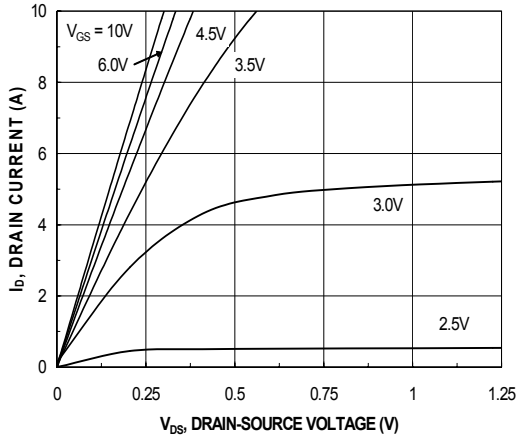


Figure 1. On Region Characteristics

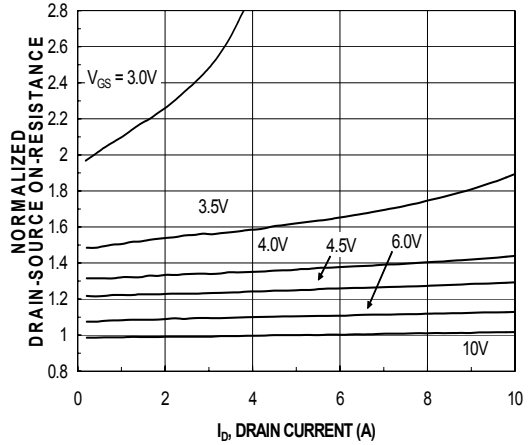


Figure 2. On Resistance vs Drain Current and Gate Voltage

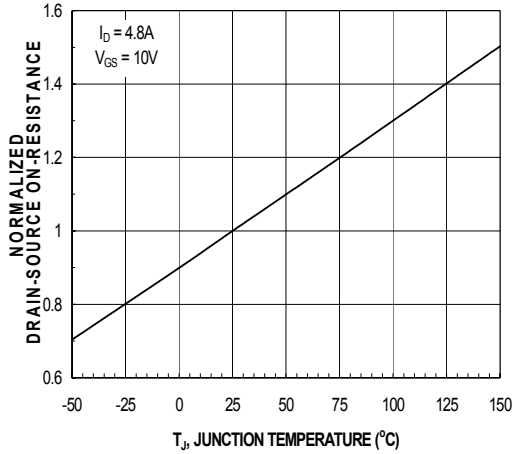


Figure 3. Normalized On Resistance vs Temperature

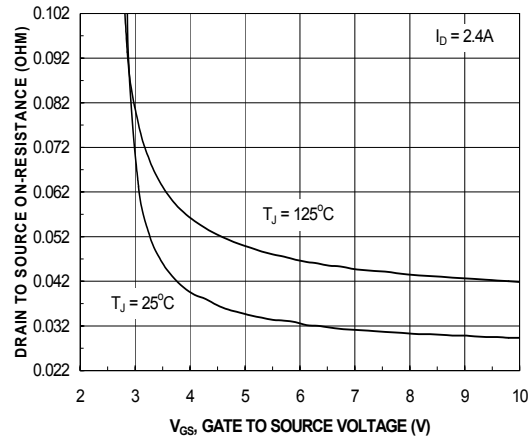


Figure 4. On Resistance vs Gate to Source Voltage

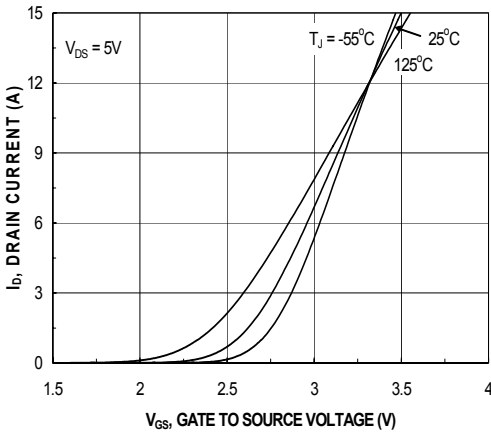


Figure 5. Transfer Characteristics

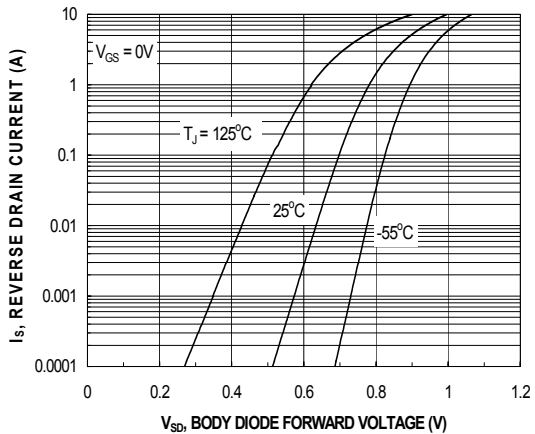


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics

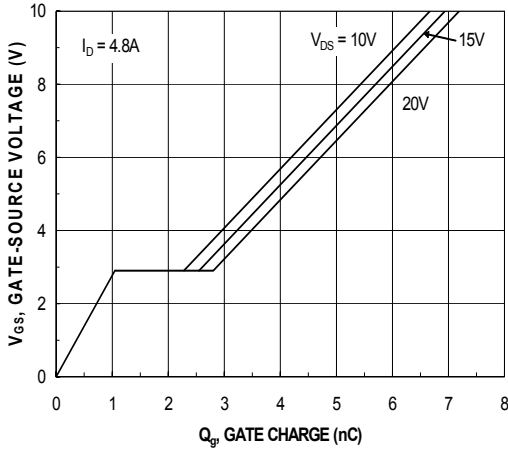


Figure 7. Gate Charge Characteristics

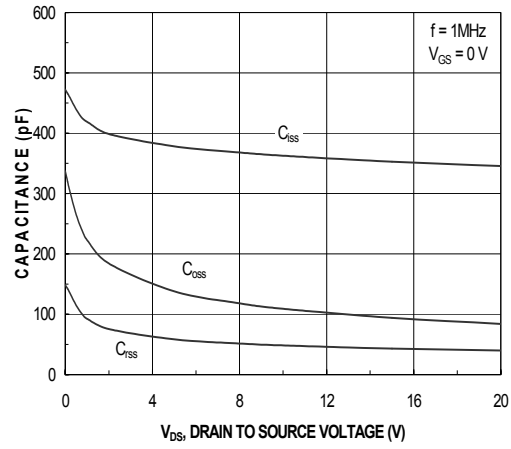


Figure 8. Capacitance vs Drain to Source Voltage

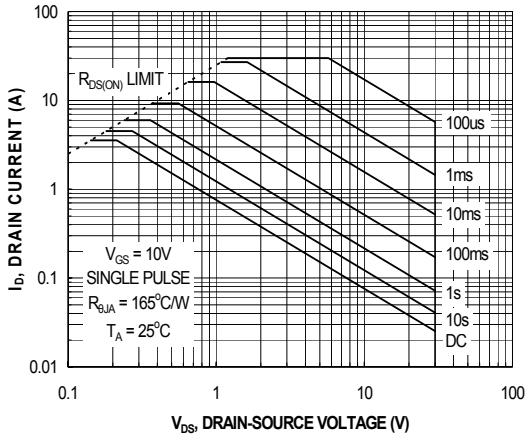


Figure 9. Forward Bias Safe Operating Area

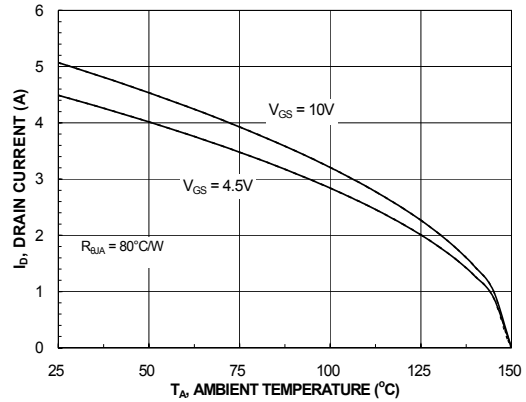


Figure 10. Maximum Continuous Drain Current vs Ambient Temperature

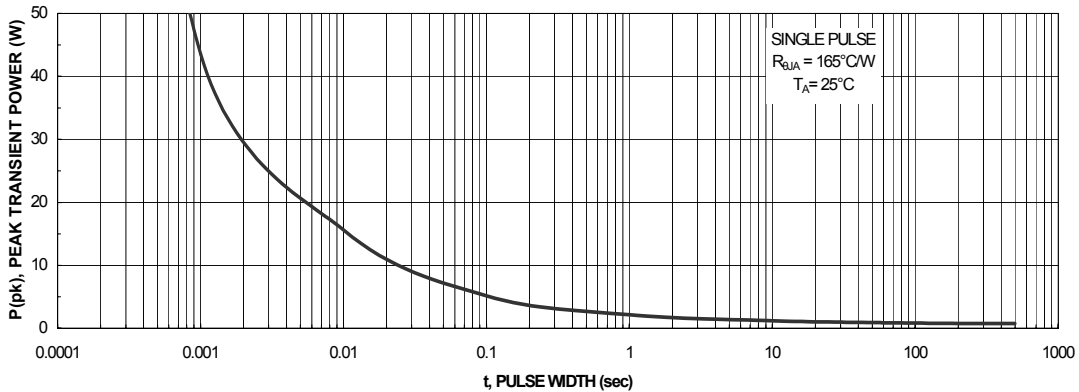


Figure 11. Single Pulse Maximum Power Dissipation

Typical Characteristics

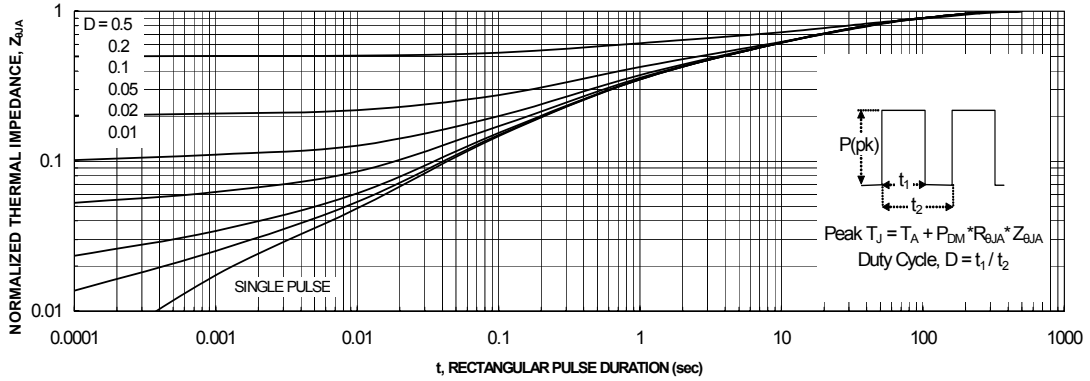
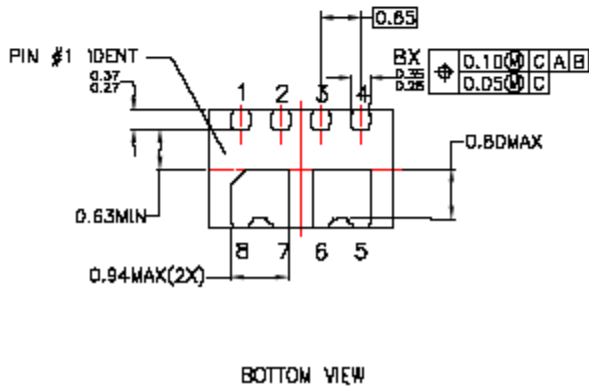
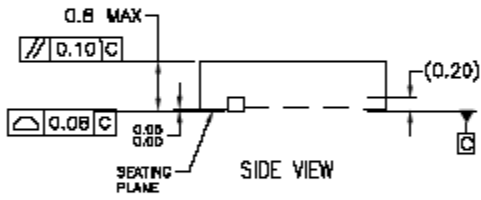
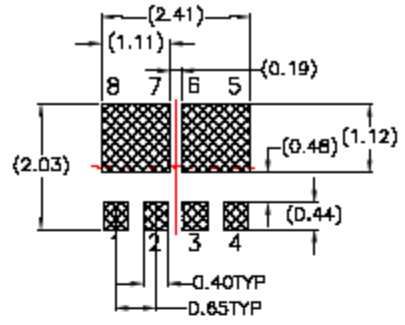
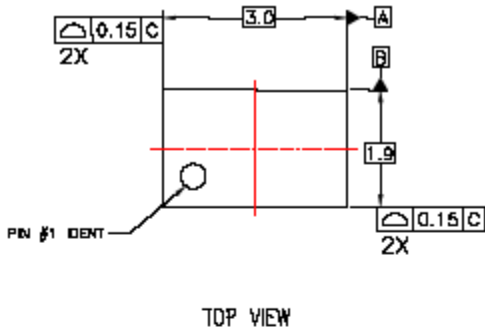


Figure 12. Transient Thermal Response Curve

Thermal characterization performed using the conditions described in Note 1b.
 Transient thermal response will change depending on the circuit board design.

Dimensional Outline and Pad Layout



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