May 2014

FDMA8884

Single N-Channel Power Trench® MOSFET

30 V, 6.5 A, 23 mΩ

Features

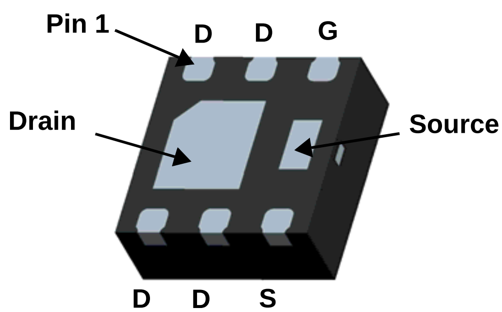
- Max $r_{DS(on)}$ = 23 mΩ at V_{GS} = 10 V, I_D = 6.5 A
- Max $r_{DS(on)}$ = 30 mΩ at V_{GS} = 4.5 V, I_D = 6.0 A
- High performance trench technology for extremely low $r_{DS(on)}$
- Fast switching speed
- RoHS Compliant

General Description

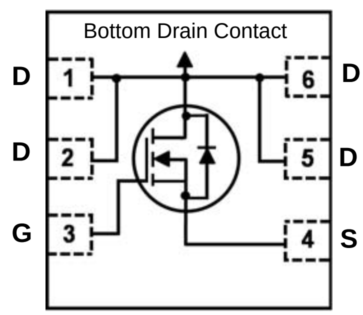
This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced Power Trench® process that has been optimized for $r_{DS(on)}$ switching performance.

Application

- Primary Switch



MicroFET 2X2 (Bottom View)



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		(Note 3)	±20	V
I_D	Drain Current -Continuous (Package limited)	T_C = 25 °C		8.0	A
	-Continuous	T_A = 25 °C	(Note 1a)	6.5	
	-Pulsed			25	
P_D	Power Dissipation		(Note 1a)	1.9	W
	Power Dissipation		(Note 1b)	0.7	
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)	65	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1b)	180	

Package Marking and Ordering Information

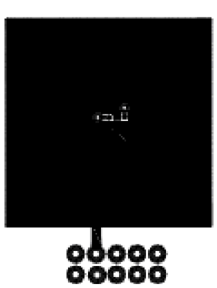
Device Marking	Device	Package	Reel Size	Tape Width	Quantity
884	FDMA8884	MicroFET 2x2	7 "	8 mm	3000 units

Electrical Characteristics T_J = 25 °C unless otherwise noted

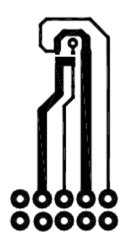
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0 V	30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25 °C		15		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 24 V, V_{GS} = 0 V			1	μA
I_{GSS}	Gate to Source Leakage Current, Forward	V_{GS} = 20 V, V_{DS} = 0 V			100	nA
On Characteristics						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 250 μA	1.2	1.8	3.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25 °C		-5		mV/°C
$r_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 6.5 A		19	23	mΩ
		V_{GS} = 4.5 V, I_D = 6.0 A		25	30	
		V_{GS} = 10 V, I_D = 6.5 A, T_J = 125 °C		25	30	
g_{FS}	Forward Transconductance	V_{DD} = 5 V, I_D = 6.5 A		26		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz		339	450	pF
C_{oss}	Output Capacitance			132	175	pF
C_{rss}	Reverse Transfer Capacitance			18	28	pF
R_g	Gate Resistance			1.1		Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 15 V, I_D = 6.5 A, V_{GS} = 10 V, R_{GEN} = 6 Ω		5	10	ns
t_r	Rise Time			1	10	ns
$t_{d(off)}$	Turn-Off Delay Time			11	20	ns
t_f	Fall Time			1	10	ns
$Q_{g(TOT)}$	Total Gate Charge	V_{GS} = 0 V to 10 V; V_{DD} = 15 V, I_D = 6.5 A		5.4	7.5	nC
	Total Gate Charge	V_{GS} = 0 V to 4.5 V		2.7	3.7	nC
Q_{gs}	Total Gate Charge			1.0		nC
Q_{gd}	Gate to Drain “Miller” Charge			0.9		nC
Drain-Source Diode Characteristics						
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 6.5 A (Note 2)		0.86	1.2	V
t_{rr}	Reverse Recovery Time	I_F = 6.5 A, di/dt = 100 A/μs		16	28	ns
Q_{rr}	Reverse Recovery Charge			4	10	nC

NOTES:

1. $R_{\theta JA}$ 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.



a. 65 °C/W when mounted on a 1 in^2 pad of 2 oz copper.



b. 180 °C/W when mounted on a minimum pad of 2 oz copper.

2. Pulse Test: Pulse Width < 300 μs, Duty cycle < 2.0 %.
3. As an N-ch device, the negative Vgs rating is for low duty cycle pulse occurrence only. No continuous rating is implied.

Typical Characteristics T_J = 25 °C unless otherwise noted

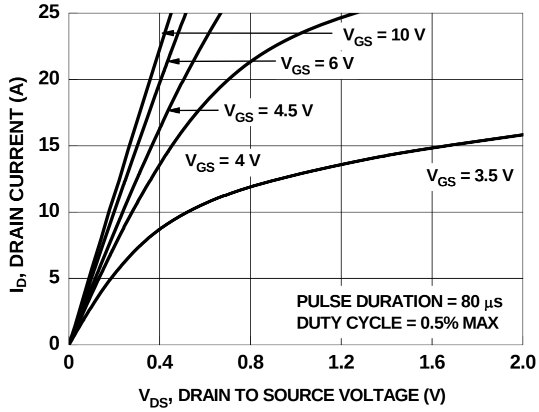


Figure 1. On Region Characteristics

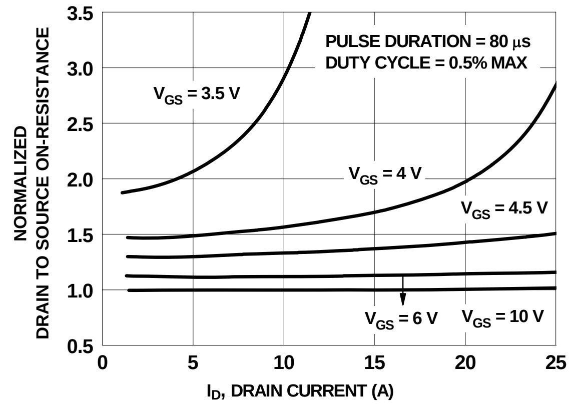


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

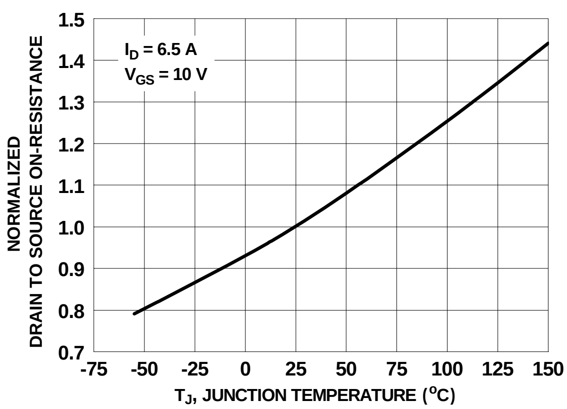


Figure 3. Normalized On Resistance vs Junction Temperature

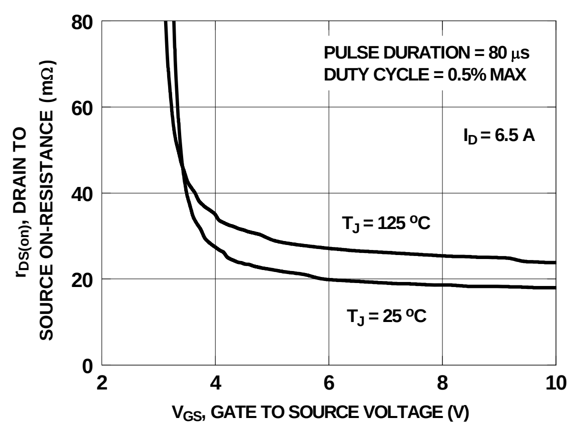


Figure 4. On-Resistance vs Gate to Source Voltage

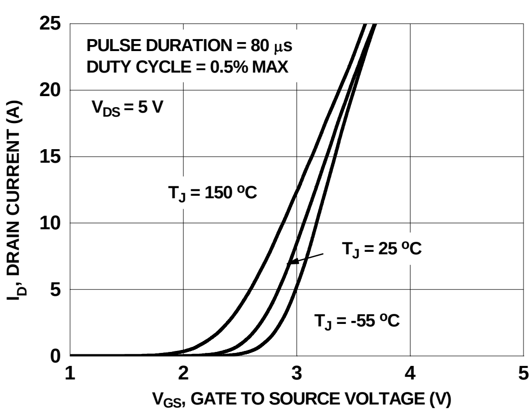


Figure 5. Transfer Characteristics

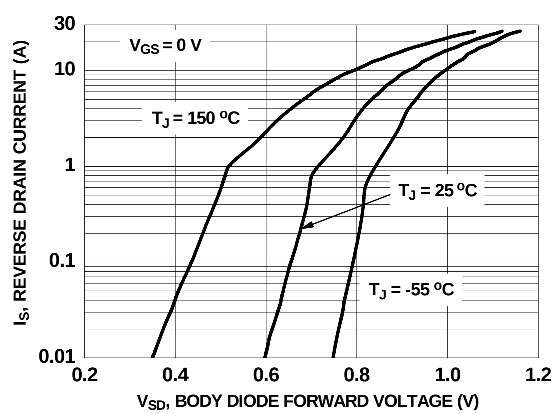


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics T_J = 25 °C unless otherwise noted

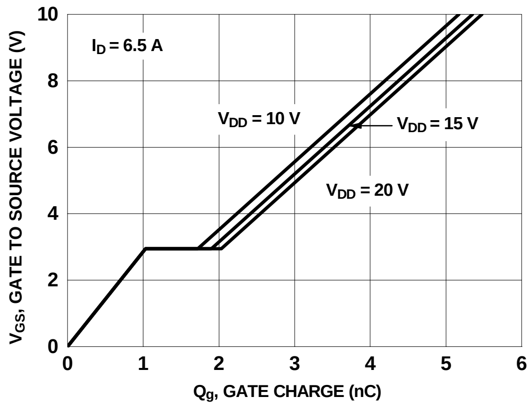


Figure 7. Gate Charge Characteristics

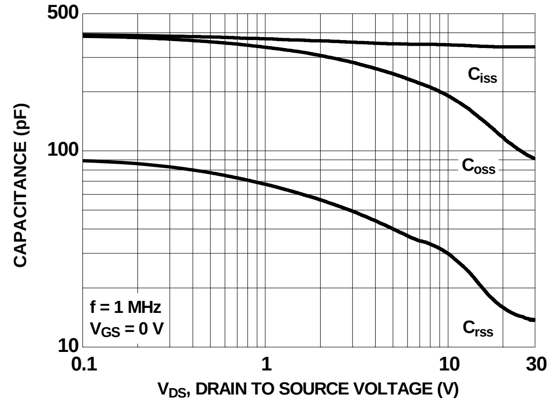


Figure 8. Capacitance vs Drain to Source Voltage

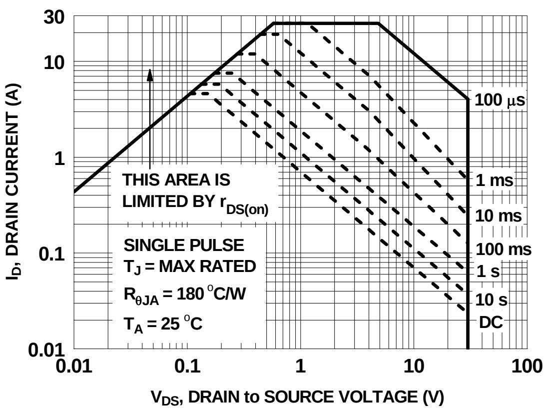


Figure 9. Forward Bias Safe Operating Area

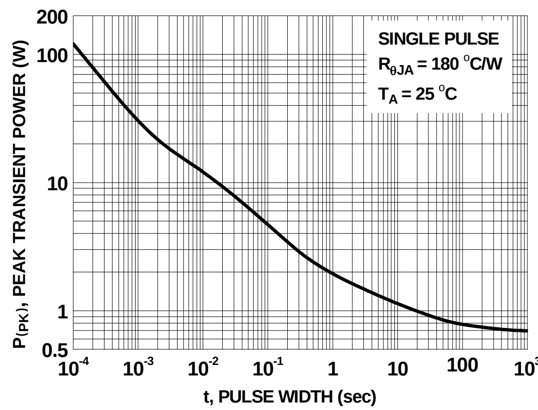


Figure 10. Single Pulse Maximum Power Dissipation

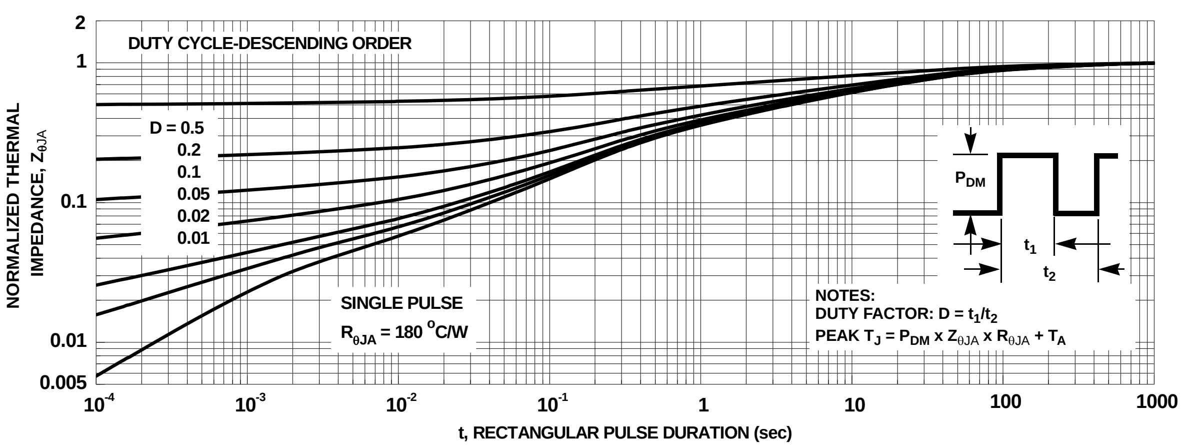
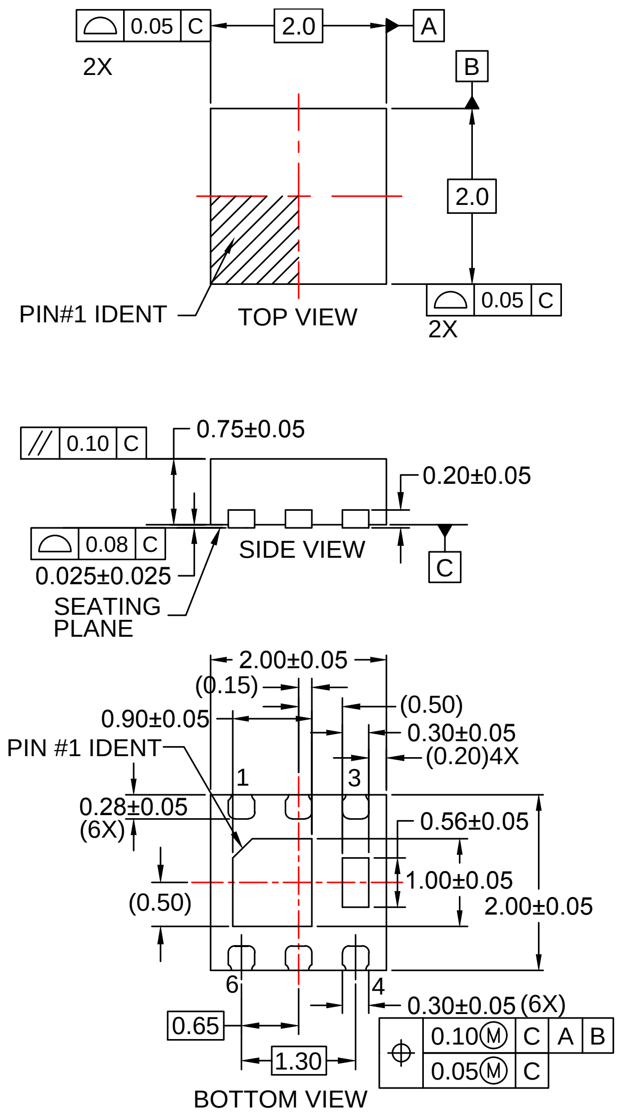
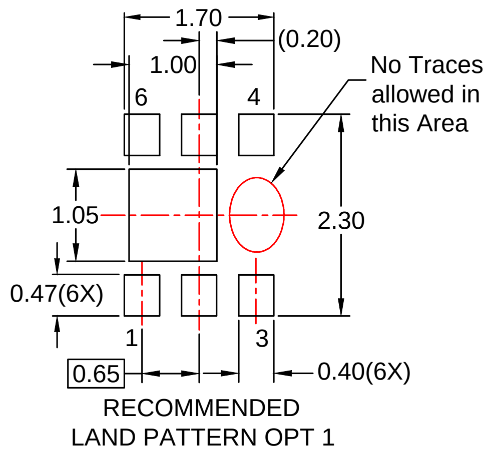


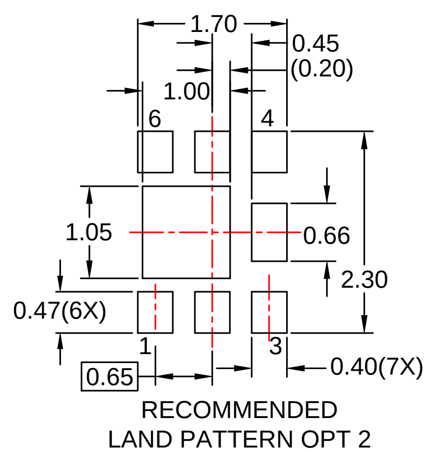
Figure 11. Junction-to-Ambient Transient Thermal Response Curve

Figure 12.

Dimensional Outline and Pad Layout







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