FAIRCHILD SEMICONDUCTOR®

July 2011

FDMS8888
N-Channel PowerTrench® MOSFET
30 V, 21 A, 9.5 mΩ

Features

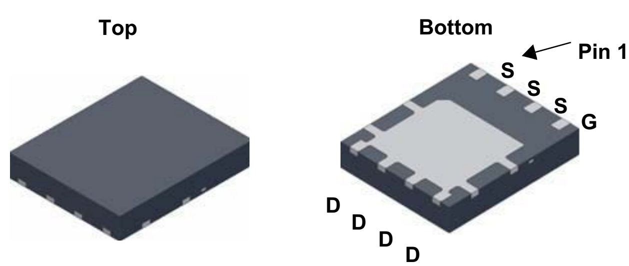
- Max $r_{DS(on)}$ = 9.5 mΩ at V_{GS} = 10 V, I_D = 13.5 A
- Max $r_{DS(on)}$ = 14.5 mΩ at V_{GS} = 4.5 V, I_D = 10.9 A
- Advanced Package and Silicon combination for low $r_{DS(on)}$ and high efficiency
- MSL1 robust package design
- RoHS Compliant

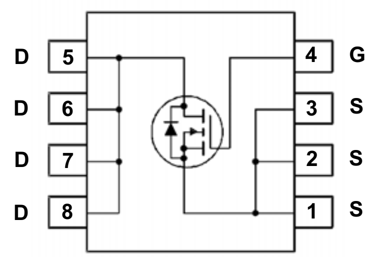
General Description

The FDMS8888 has been designed to minimize losses in power conversion application. Advancements in both silicon and package technologies have been combined to offer the lowest $r_{DS(on)}$ while maintaining excellent switching performance.

Applications

- Synchronous Buck for Notebook Vcore and Server
- Notebook Battery Pack
- Load Switch





Power 56

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 (Package limited) T_C = 25 °C	21	A
	-Continuous (Silicon limited) T_C = 25 °C	51	
	-Continuous T_A = 25 °C (Note 1a)	13.5	
	-Pulsed	80	
E_{AS}	Single Pulse Avalanche Energy (Note 3)	54	mJ
P_D	Power Dissipation T_C = 25 °C	42	W
	Power Dissipation T_A = 25 °C (Note 1a)	2.5	
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	°C

Thermal Characteristics

Symbol	Parameter	Ratings	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	3.3	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	50	

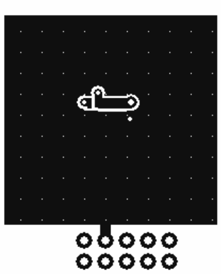
Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
8888	FDMS8888	Power 56	13 ”	12 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		19		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	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	1.9	2.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25 °C		-7		mV/°C
$r_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 13.5 A		8	9.5	mΩ
		V_{GS} = 4.5 V, I_D = 10.9 A		11	14.5	
		V_{GS} = 10 V, I_D = 13.5 A, T_J = 125 °C		12	14.5	
g_{FS}	Forward Transconductance	V_{DD} = 10 V, I_D = 13.5 A		78		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz		1195	1585	pF
C_{oss}	Output Capacitance			234	315	pF
C_{rss}	Reverse Transfer Capacitance			161	245	pF
R_g	Gate Resistance			0.9	2.5	Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 15 V, I_D = 13.5 A, V_{GS} = 10 V, R_{GEN} = 6 Ω		9	18	ns
t_r	Rise Time			6	12	ns
$t_{d(off)}$	Turn-Off Delay Time			23	27	ns
t_f	Fall Time			4	10	ns
Q_g	Total Gate Charge	V_{GS} = 0 V to 10 V; V_{DD} = 15 V, I_D = 13.5 A		23	33	nC
Q_g	Total Gate Charge	V_{GS} = 0 V to 5 V; V_{DD} = 15 V, I_D = 13.5 A		13	18	nC
Q_{gs}	Gate to Source Charge	V_{DD} = 15 V, I_D = 13.5 A		3.5		nC
Q_{gd}	Gate to Drain “Miller” Charge			5.1		nC
Drain-Source Diode Characteristics						
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 2.1 A (Note 2)		0.74	1.2	V
		V_{GS} = 0 V, I_S = 13.5 A (Note 2)		0.84	1.2	V
t_{rr}	Reverse Recovery Time	I_F = 13.5 A, di/dt = 100 A/μs		20	32	ns
Q_{rr}	Reverse Recovery Charge			8	16	nC

NOTES:
1. $R_{\theta JA}$ is determined with the device mounted on a 1 in^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. 50 °C/W when mounted on a 1 in^2 pad of 2 oz copper.

b. 125 °C/W when mounted on a minimum pad of 2 oz copper.

2. Pulse Test: Pulse Width < 300 μs, Duty cycle < 2.0%.
3. Starting T_J = 25 °C, L = 0.3 mH, I_{AS} = 19 A, V_{DD} = 27 V, V_{GS} = 10 V.

Typical Characteristics T_J = 25 °C unless otherwise noted

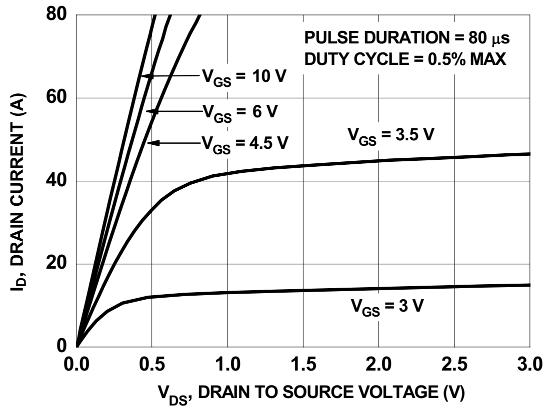


Figure 1. On Region Characteristics

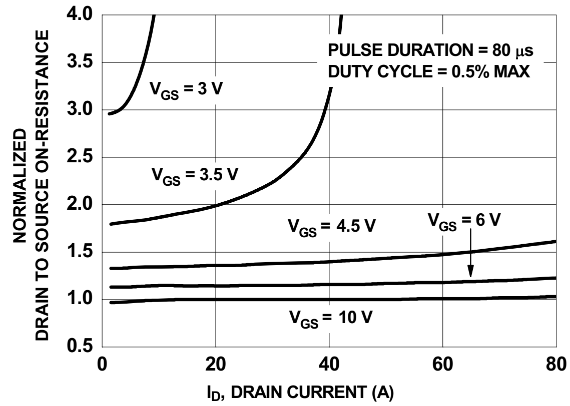


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

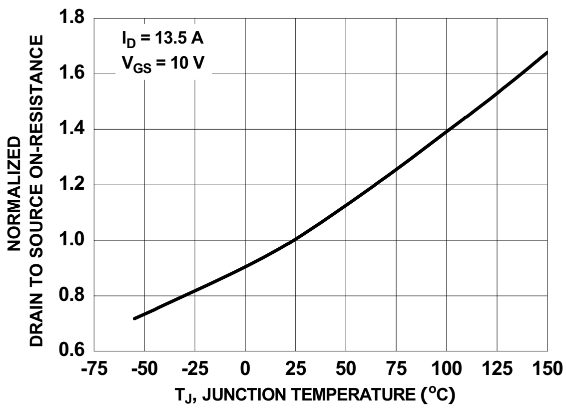


Figure 3. Normalized On Resistance vs Junction Temperature

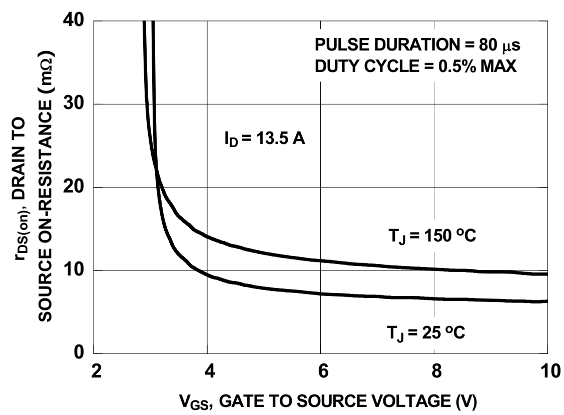


Figure 4. On-Resistance vs Gate to Source Voltage

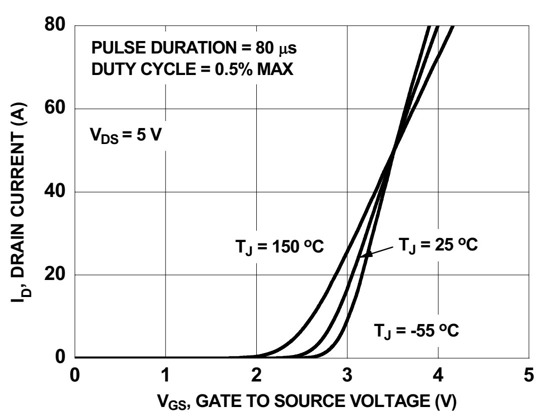


Figure 5. Transfer Characteristics

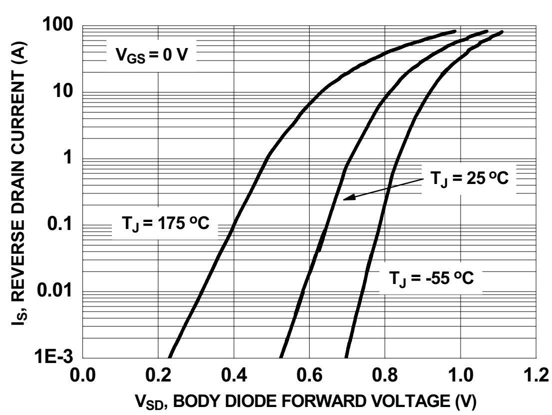


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics T_J = 25 °C unless otherwise noted

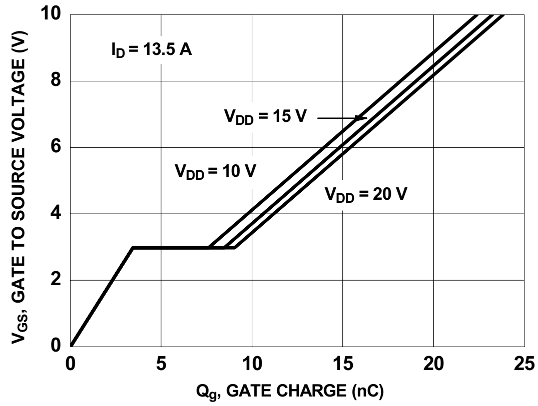


Figure 7. Gate Charge Characteristics

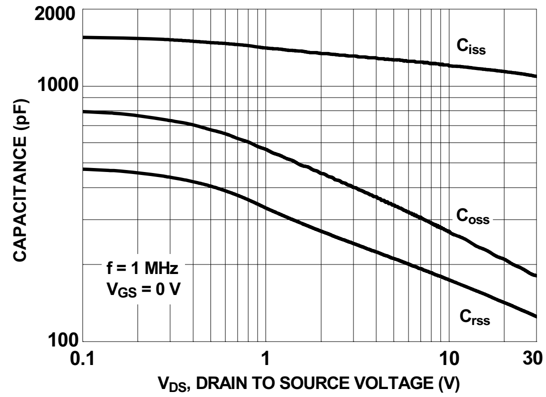


Figure 8. Capacitance vs Drain to Source Voltage

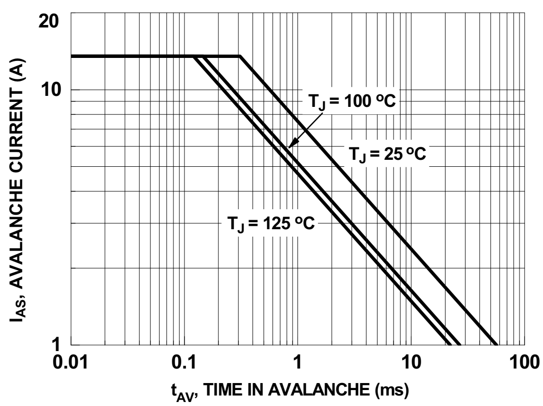


Figure 9. Unclamped Inductive Switching Capability

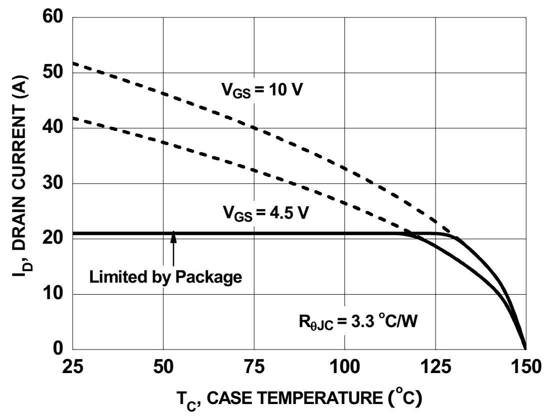


Figure 10. Maximum Continuous Drain Current vs Case Temperature

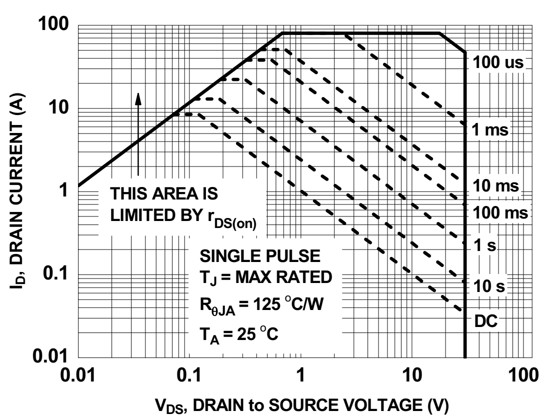


Figure 11. Forward Bias Safe Operating Area

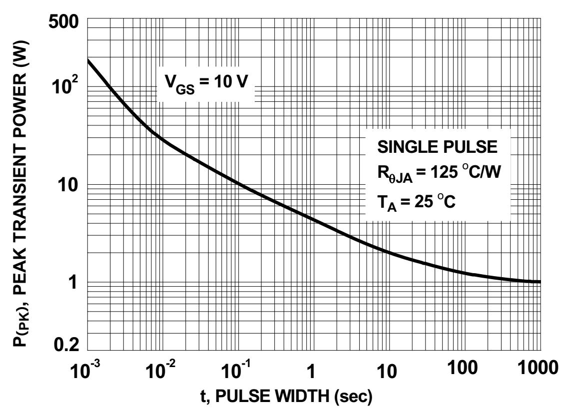


Figure 12. Single Pulse Maximum Power Dissipation

Typical Characteristics T_J = 25 °C unless otherwise noted

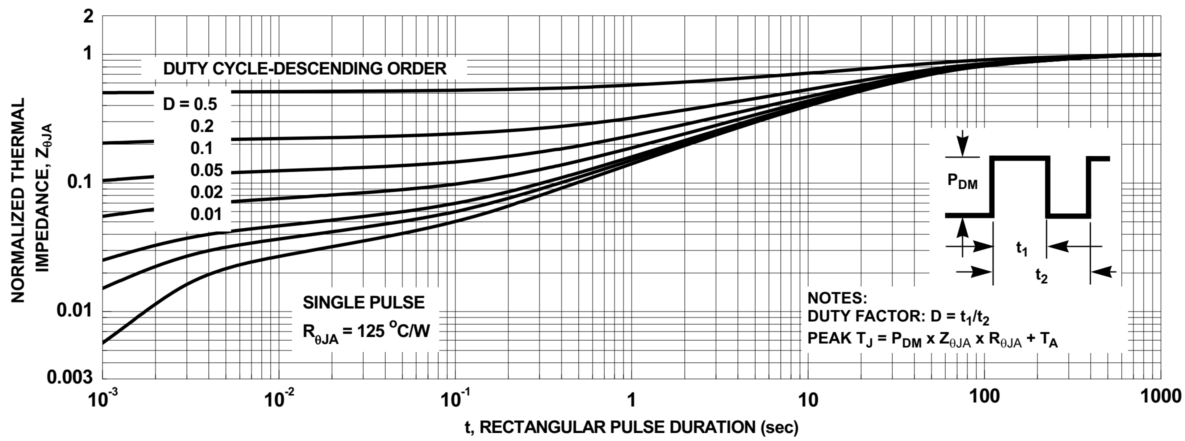
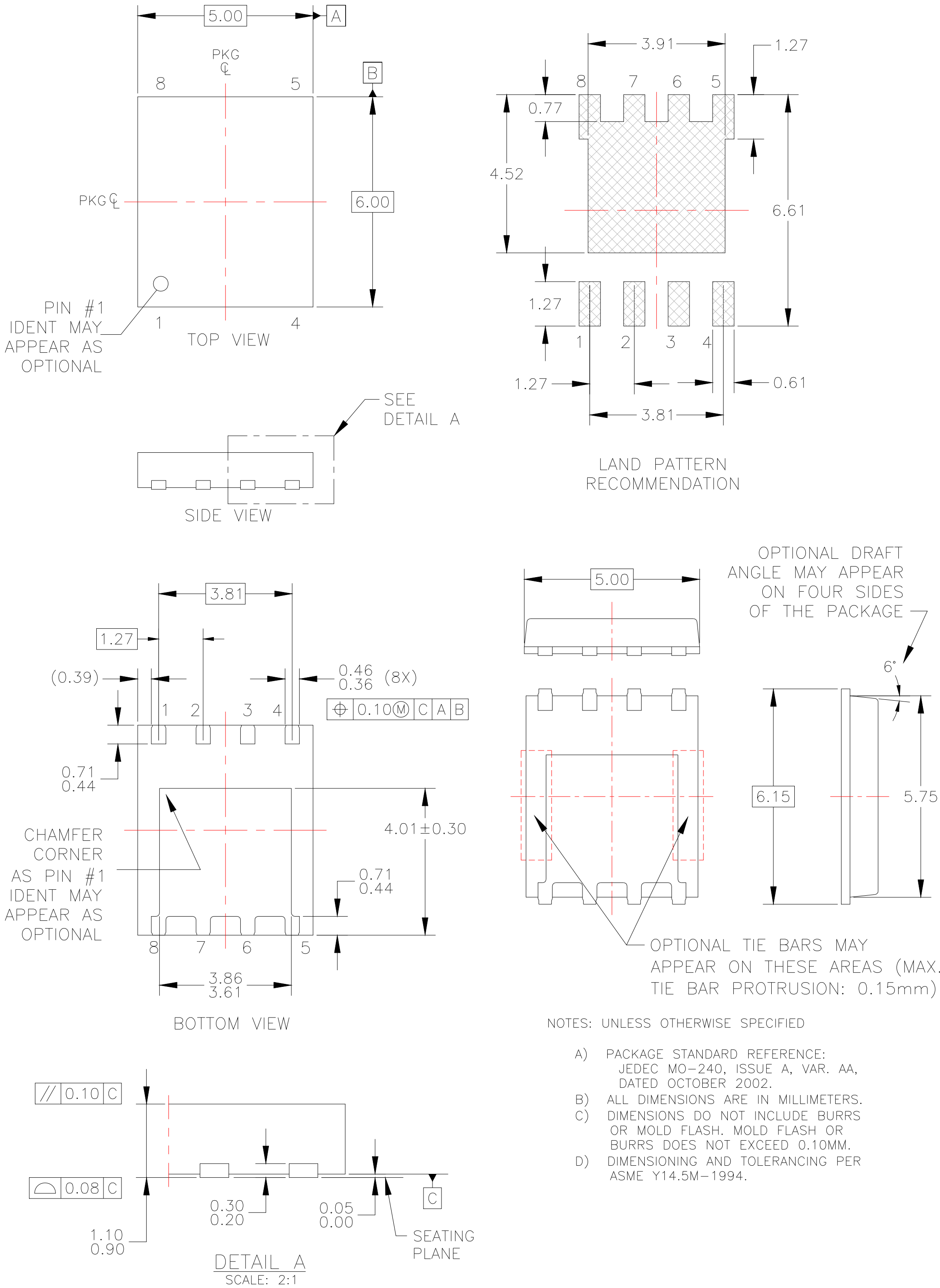


Figure 13. Junction-to-Ambient Transient Thermal Response Curve

Dimensional Outline and Pad Layout



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A) PACKAGE STANDARD REFERENCE: JEDEC MO-240, ISSUE A, VAR. AA, DATED OCTOBER 2002.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH. MOLD FLASH OR BURRS DOES NOT EXCEED 0.10MM.
D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.

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Rev. I55