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FDMS8674

N-Channel PowerTrench® MOSFET
30V, 21A, 5.0mΩ

Features

- Max $r_{DS(on)}$ = 5.0mΩ at V_{GS} = 10V, I_D = 17A

- Max $r_{DS(on)}$ = 8.0mΩ at V_{GS} = 4.5V, I_D = 14A

- Advanced Package and Silicon combination for low $r_{DS(on)}$ and high efficiency

- MSL1 robust package design

- RoHS Compliant

General Description

The FDMS8674 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

- Computing VR & IMVP Vcore

- Secondary Side Synchronous Rectifier

- POL DC/DC Converter

- Oring FET/ Load Switch

Pin 1

S S S G
D D D D

Power 56 (Bottom View)

D	5		4	G
D	6		3	S
D	7		2	S
D	8		1	S
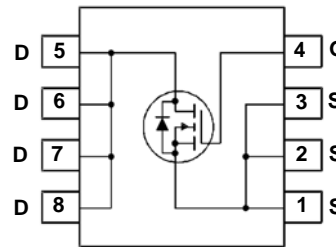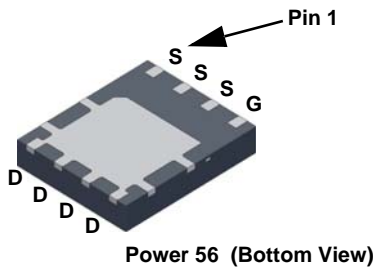
MOSFET Maximum Ratings T_A = 25°C unless otherwise noted

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		94	
	-Continuous (Silicon limited)	T_C = 100°C		62	
	-Continuous	T_A = 25°C	(Note 1a)	17	
	-Pulsed			150	
E_{AS}	Single Pulse Avalanche Energy		(Note 3)	181	mJ
P_D	Power Dissipation	T_C = 25°C		78	W
	Power Dissipation	T_A = 25°C	(Note 1a)	2.5	
	Power Dissipation	T_A = 85°C	(Note 1a)	1.3	
T_J, T_{STG}	Operating and Storage Junction Temperature Range			-55 to +150	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case		1.6	°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
FDMS8674	FDMS8674	Power 56	13''	12mm	3000units

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Electrical Characteristics T_J = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units

Off Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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		25		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 24V, V_{GS} = 0V			1	µA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±20V, V_{DS} = 0V			±100	nA

On Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 250µA	1.0	1.8	3.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250µA, referenced to 25°C		-6		mV/°C
$r_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10V, I_D = 17A		4.1	5.0	mΩ
		V_{GS} = 4.5V, I_D = 14A		5.8	8.0	
		V_{GS} = 10V, I_D = 17A, T_J = 125°C		5.8	8.3	
g_{FS}	Forward Transconductance	V_{DD} = 10V, I_D = 17A		87		S

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
C_{iss}	Input Capacitance	V_{DS} = 15V, V_{GS} = 0V, f = 1MHz		1745	2320	pF
C_{oss}	Output Capacitance			860	1145	pF
C_{rss}	Reverse Transfer Capacitance			130	195	pF
R_g	Gate Resistance	f = 1MHz		0.9		Ω

Switching Characteristics

Symbol	Parameter	Test Conditions		Min	Typ	Max	Units
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 15V, I_D = 17A, V_{GS} = 10V, R_{GEN} = 6Ω			11	20	ns
t_r	Rise Time				4	10	ns
$t_{d(off)}$	Turn-Off Delay Time				26	42	ns
t_f	Fall Time				3	10	ns
Q_g	Total Gate Charge	V_{GS} = 0V to 10V	V_{DD} = 15V, I_D = 17A		26	37	nC
Q_g	Total Gate Charge	V_{GS} = 0V to 5V			14	20	nC
Q_{gs}	Gate to Source Charge				4.8		nC
Q_{gd}	Gate to Drain "Miller" Charge				3.5		nC

Drain-Source Diode Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0V, I_S = 2.1A (Note 2)		0.7	1.2	V
		V_{GS} = 0V, I_S = 17A (Note 2)		0.8	1.2	V
t_{rr}	Reverse Recovery Time	I_F = 17A, di/dt = 100A/µs		40	64	ns
Q_{rr}	Reverse Recovery Charge			30	48	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.
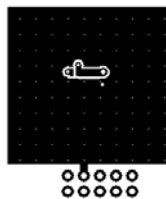
a. 50°C/W when mounted on a 1 in^2 pad of 2 oz copper.

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

2. Pulse Test: Pulse Width < 300µs, Duty cycle < 2.0%.
3. Starting T_J = 25°C, L = 3mH, I_{AS} = 11A, V_{DD} = 30V, V_{GS} = 10V.

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FDMS8674 N-Channel PowerTrench® MOSFET

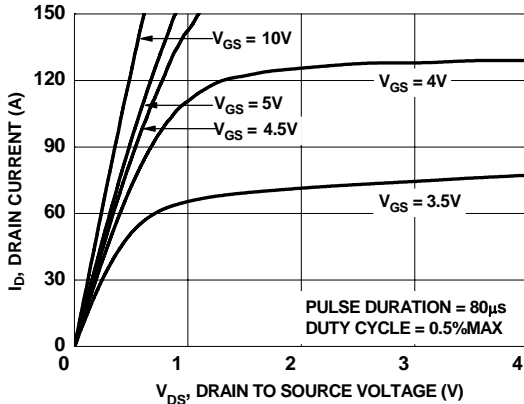## Typical Characteristics T_J = 25°C unless otherwise noted
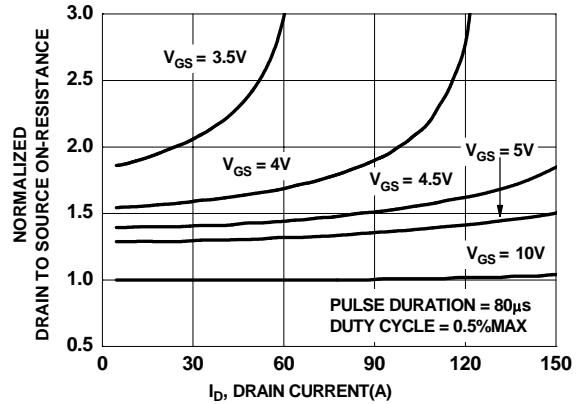

Figure 1. On-Region Characteristics

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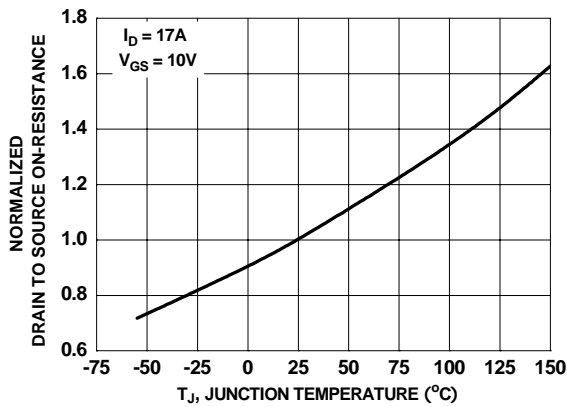

Figure 3. Normalized On-Resistance vs Junction Temperature
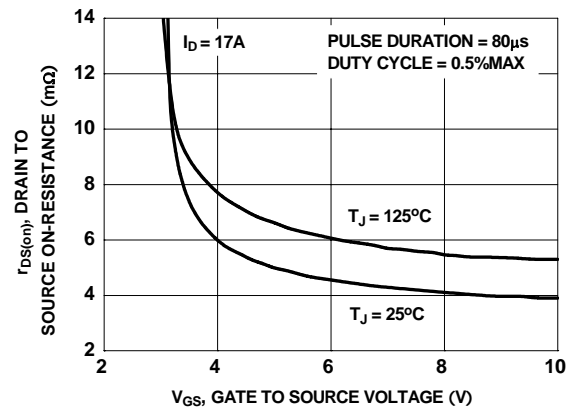

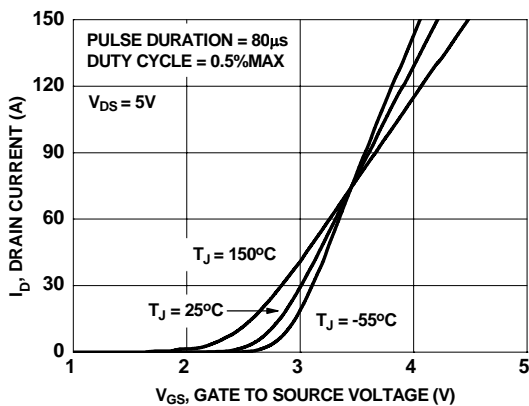Figure 4. On-Resistance vs Gate to Source Voltage
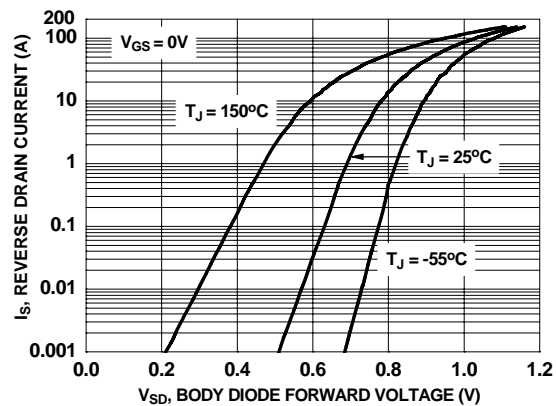

Figure 5. Transfer Characteristics

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

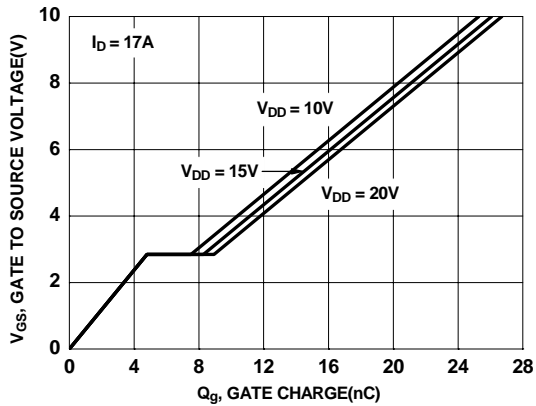## Typical Characteristics $T_J = 25°C$ unless otherwise noted

Figure 7. Gate Charge Characteristics
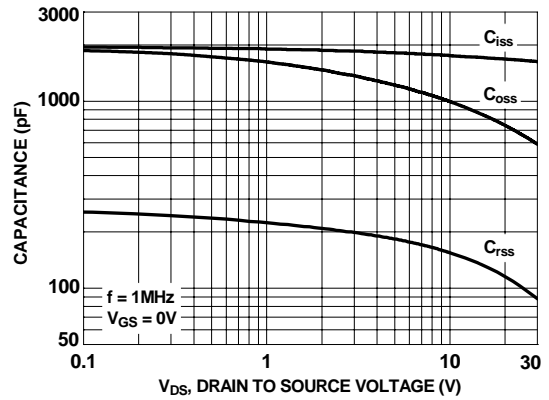
Figure 8. Capacitance vs Drain to Source Voltage
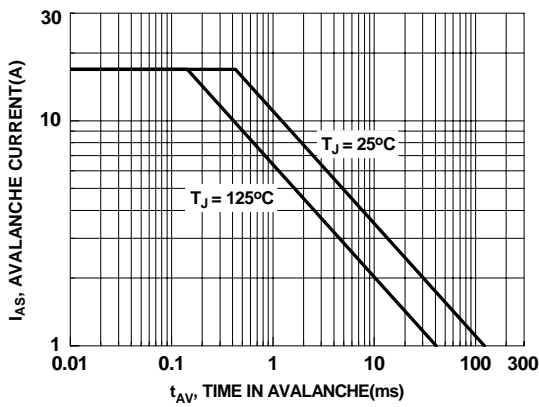
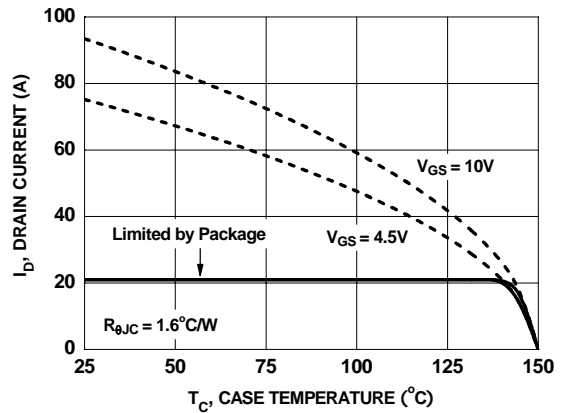**Figure 9. Unclamped Inductive Switching Capability**

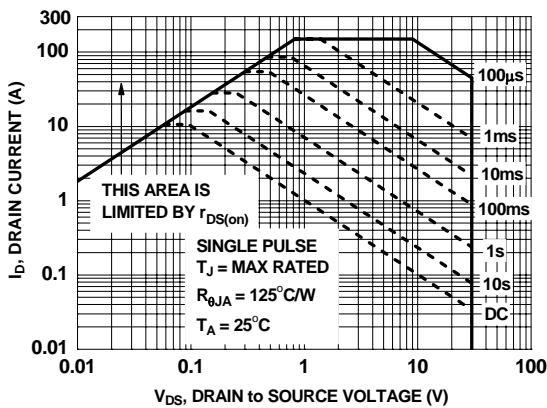**Figure 10. Maximum Continuous Drain Current vs Case Temperature**
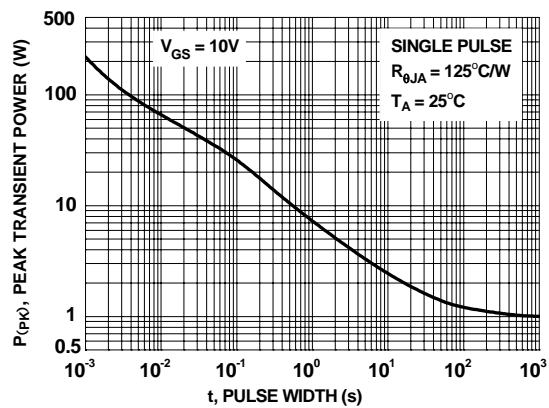

Figure 11. Forward Bias Safe Operating Area

Figure 12. Single Pulse Maximum Power Dissipation

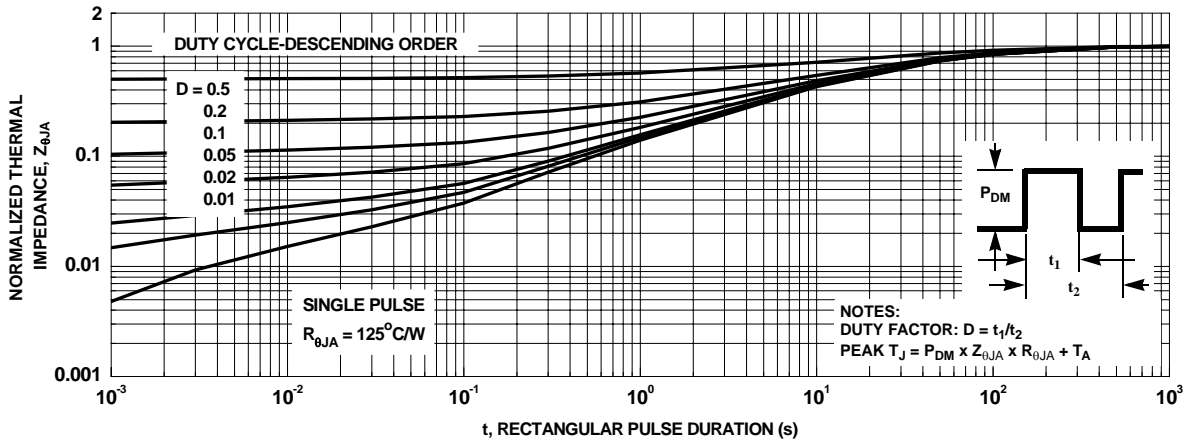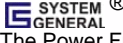## Typical Characteristics T_J = 25°C unless otherwise noted

Figure 13. Transient Thermal Response Curve

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