

# 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

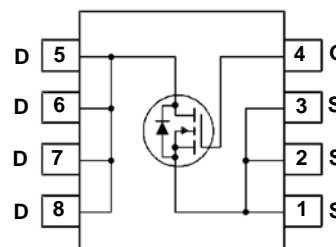
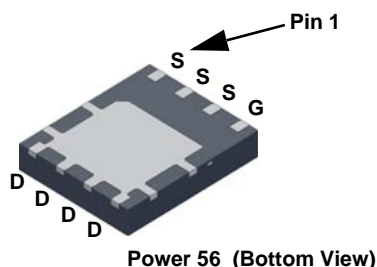


### General Description

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 Buck
- POL DC-DC Converter
- Oring FET / Load Switch



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

Symbol	Parameter	Ratings	Units
$V_{DS}$	Drain to Source Voltage	30	V
$V_{GS}$	Gate to Source Voltage	$\pm 20$	V
$I_D$	Drain Current -Continuous (Package limited) $T_C = 25^\circ\text{C}$	21	A
	-Continuous (Silicon limited) $T_C = 25^\circ\text{C}$	94	
	-Continuous $T_A = 25^\circ\text{C}$ (Note 1a)	17	
	-Pulsed	150	
$E_{AS}$	Single Pulse Avalanche Energy (Note 3)	181	mJ
$P_D$	Power Dissipation $T_C = 25^\circ\text{C}$	78	W
	Power Dissipation $T_A = 25^\circ\text{C}$ (Note 1a)	2.5	
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ\text{C}$

### Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.6	$^\circ\text{C/W}$
$R_{\theta JA}$	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

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

**On Characteristics**

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$ , $I_D = 250\mu\text{A}$	1.0	1.8	3.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250\mu\text{A}$ , referenced to $25^\circ\text{C}$		-6		mV/ $^\circ\text{C}$
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{V}$ , $I_D = 17\text{A}$		4.1	5.0	m $\Omega$
		$V_{GS} = 4.5\text{V}$ , $I_D = 14\text{A}$		5.8	8.0	
		$V_{GS} = 10\text{V}$ , $I_D = 17\text{A}$ , $T_J = 125^\circ\text{C}$		5.8	8.3	
$g_{FS}$	Forward Transconductance	$V_{DD} = 10\text{V}$ , $I_D = 17\text{A}$		87		S

**Dynamic Characteristics**

$C_{iss}$	Input Capacitance	$V_{DS} = 15\text{V}$ , $V_{GS} = 0\text{V}$ , $f = 1\text{MHz}$		1745	2320	pF
$C_{oss}$	Output Capacitance			860	1145	pF
$C_{rss}$	Reverse Transfer Capacitance			130	195	pF
$R_g$	Gate Resistance	$f = 1\text{MHz}$		0.9		$\Omega$

**Switching Characteristics**

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 15\text{V}$ , $I_D = 17\text{A}$ , $V_{GS} = 10\text{V}$ , $R_{GEN} = 6\Omega$		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	$V_{GS} = 0\text{V}$ to $10\text{V}$	$V_{DD} = 15\text{V}$ , $I_D = 17\text{A}$	26	37	nC
$Q_g$	Total Gate Charge	$V_{GS} = 0\text{V}$ to $5\text{V}$		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**

$V_{SD}$	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{V}$ , $I_S = 2.1\text{A}$ (Note 2)		0.7	1.2	V
		$V_{GS} = 0\text{V}$ , $I_S = 17\text{A}$		0.8	1.2	V
$t_{rr}$	Reverse Recovery Time	$I_F = 17\text{A}$ , $di/dt = 100\text{A}/\mu\text{s}$		40	64	ns
$Q_{rr}$	Reverse Recovery Charge			30	48	nC

## NOTES:

1.  $R_{\theta JA}$  is determined with the device mounted on a  $1\text{in}^2$  pad 2 oz copper pad on a  $1.5 \times 1.5\text{in.}$  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.  $50^\circ\text{C}/\text{W}$  when mounted on a  $1\text{in}^2$  pad of 2 oz copper.



b.  $125^\circ\text{C}/\text{W}$  when mounted on a minimum pad of 2 oz copper.

2. Pulse Test: Pulse Width  $< 300\mu\text{s}$ , Duty cycle  $< 2.0\%$ .

3. Starting  $T_J = 25^\circ\text{C}$ ,  $L = 3\text{mH}$ ,  $I_{AS} = 11\text{A}$ ,  $V_{DD} = 30\text{V}$ ,  $V_{GS} = 10\text{V}$ .

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

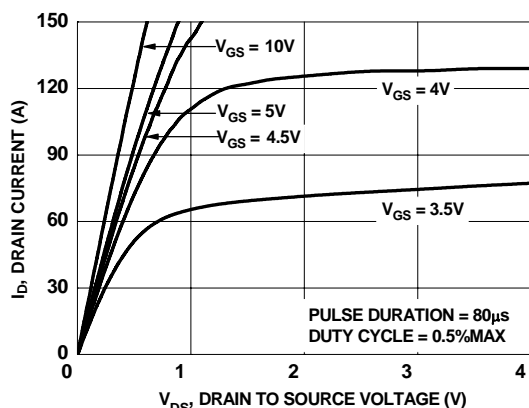


Figure 1. On-Region Characteristics

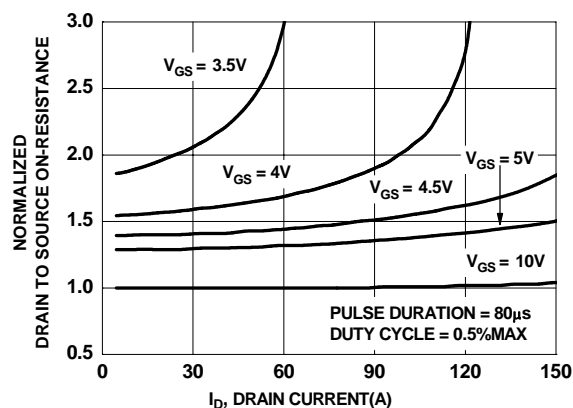


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

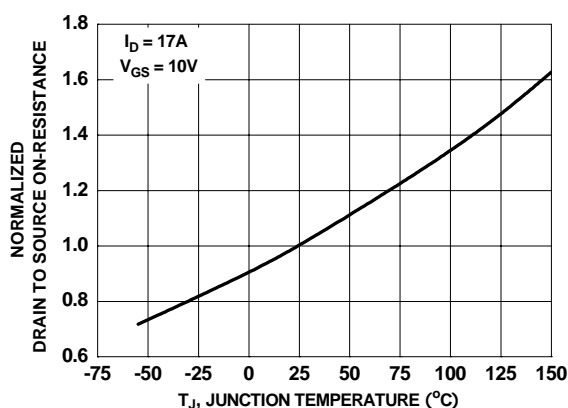


Figure 3. Normalized On-Resistance vs Junction Temperature

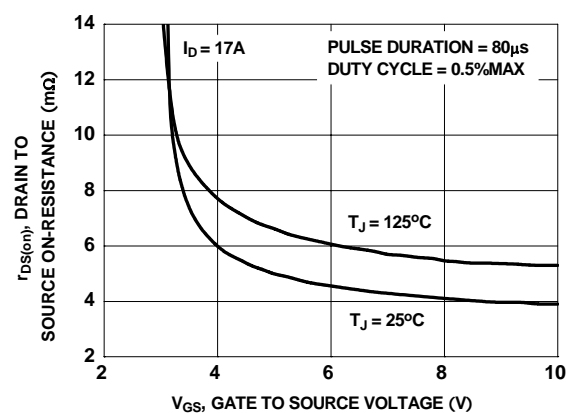


Figure 4. On-Resistance vs Gate to Source Voltage

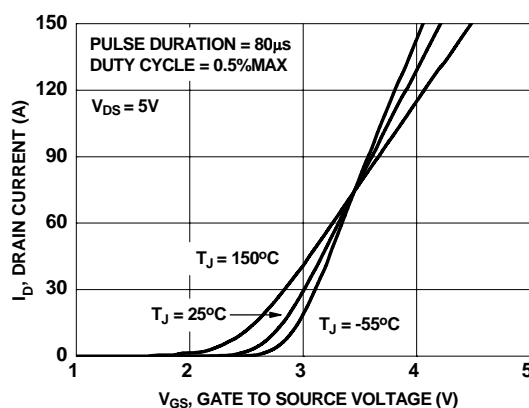


Figure 5. Transfer Characteristics

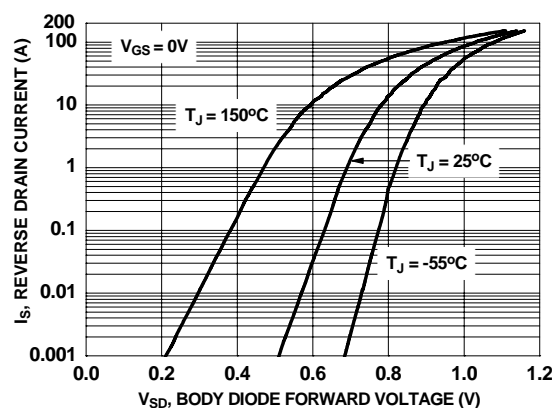


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

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

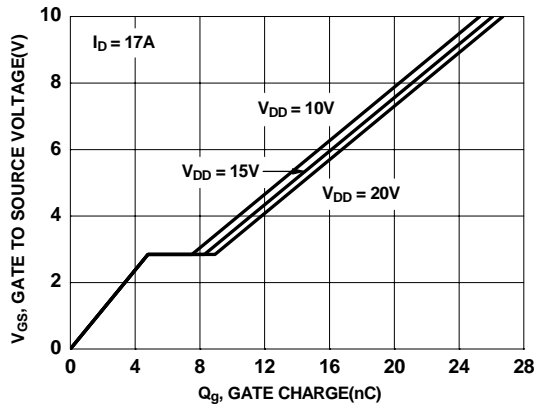


Figure 7. Gate Charge Characteristics

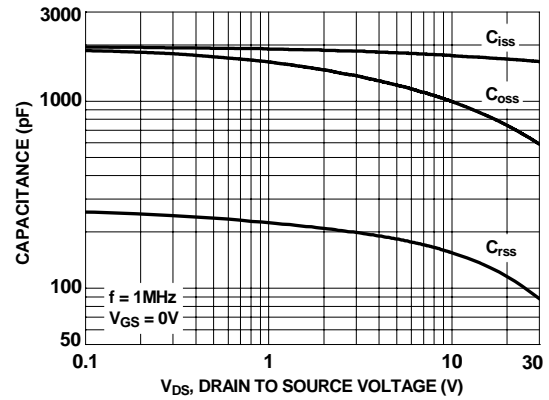


Figure 8. Capacitance vs Drain to Source Voltage

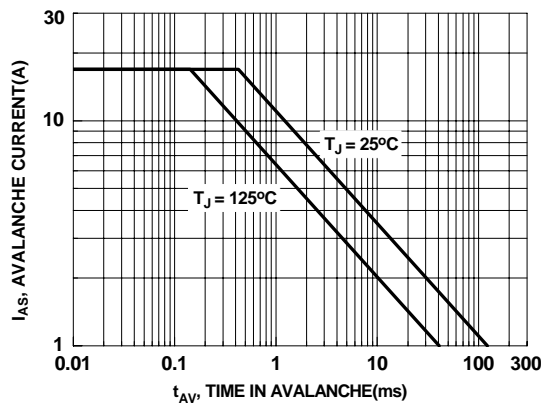


Figure 9. Unclamped Inductive Switching Capability

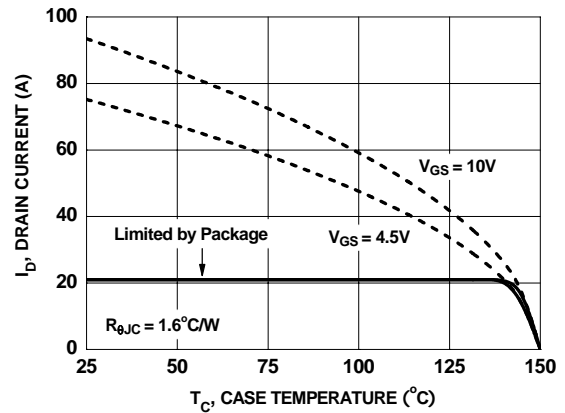


Figure 10. Maximum Continuous Drain Current vs Case Temperature

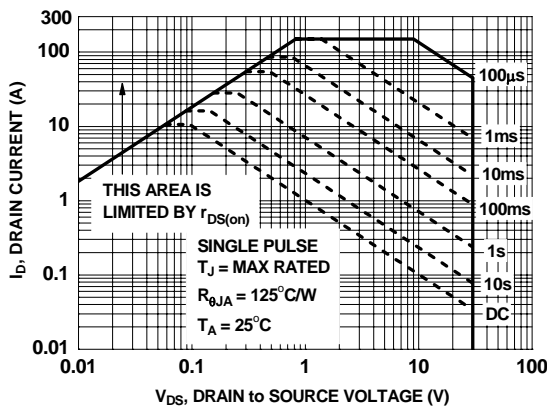


Figure 11. Forward Bias Safe Operating Area

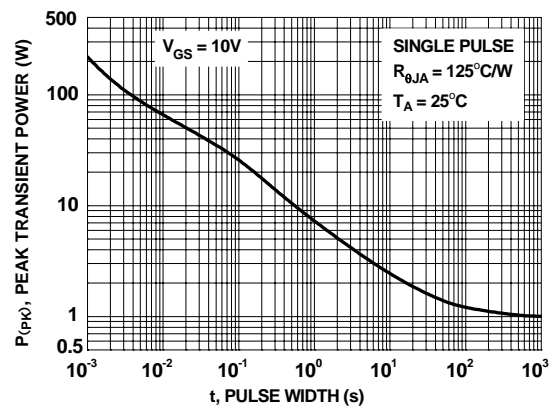
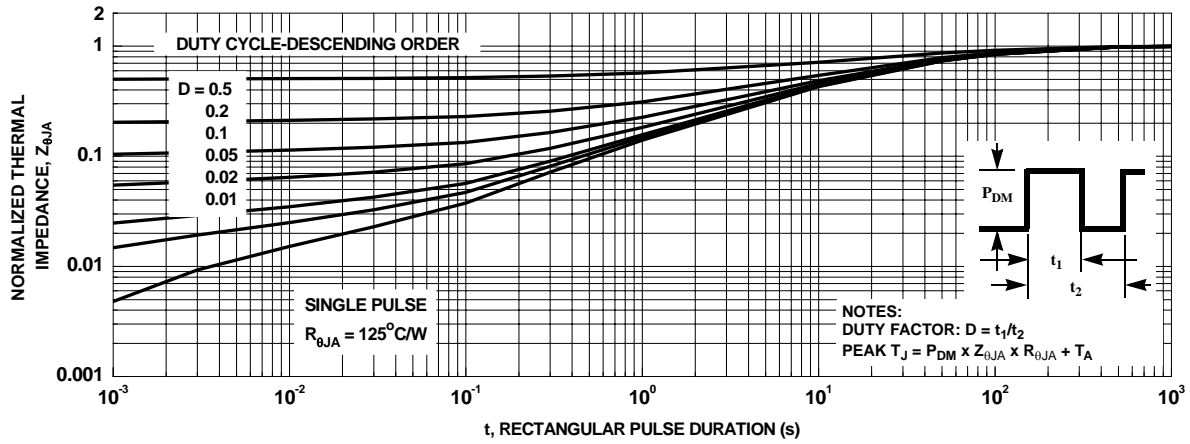



Figure 12. Single Pulse Maximum Power Dissipation

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



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Rev. I31