FAIRCHILD
SEMICONDUCTOR®

May 2006

FDMC2674
N-Channel UltraFET Trench® MOSFET
220V, 1A, 366mΩ

Features

- Max $r_{DS(on)}$ = 366mΩ at V_{GS} = 10V, I_D = 1A
- Typ Q_g = 12.7nC at V_{GS} = 10V
- Low Miller charge
- Low Q_{rr} Body Diode
- Optimized efficiency at high frequencies
- UIS Capability (Single Pulse and Repetitive Pulse)
- RoHS Compliant

General Description

UltraFET® device combines characteristics that enable benchmark efficiency in power conversion applications. Optimized for $r_{DS(on)}$, low ESR, low total and Miller gate charge, these devices are ideal for high frequency DC to DC converters.

Applications

- DC/DC converters and Off-Line UPS
- Distributed Power Architectures

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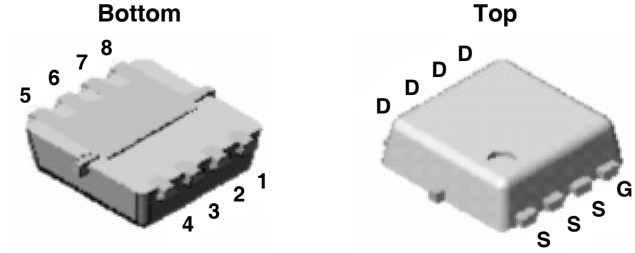
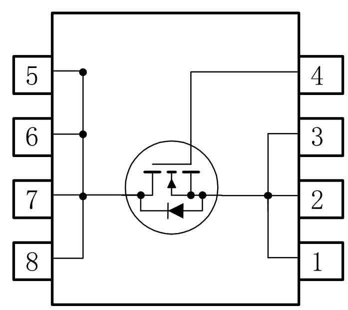


MLP 3.3x3.3



MOSFET Maximum Ratings T_A = 25°C unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DS}	Drain to Source Voltage	220	V
V_{GS}	Gate to Source Voltage	±20	V
I_D	Drain Current -Continuous	1	A
	-Pulsed	13.8	
E_{AS}	Single Pulse Avalanche Energy (Note 3)	13	mJ
P_D	Power Dissipation for Single Operation	2.4	W
T_J, T_{STG}	Operating and Storage Temperature	-55 to 150	°C

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance , Junction to Ambient (Note 1a)	52	°C/W
$R_{\theta JA}$	Thermal Resistance , Junction to Ambient (Note 1b)	108	°C/W

Package Marking and Ordering Information

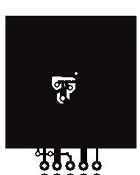
Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMC2674	FDMC2674	MLP 3.3 x 3.3	7”	12mm	3000 units

Electrical Characteristics T_J = 25°C unless otherwise noted

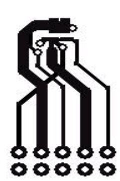
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250μA, V_{GS} = 0V	220			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250μA, referenced to 25°C		248		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 176V, V_{GS} = 0V			1	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±20V,			±100	nA
On Characteristics (Note 2)						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 250μA	2	3.4	4	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250μA, referenced to 25°C		-10.2		mV/°C
$r_{DS(on)}$	Drain to Source On Resistance	V_{GS} = 10V, I_D = 1A		305	366	mΩ
		V_{GS} = 10V, I_D = 1A, T_J =150°C		678	814	
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} =100V, V_{GS} = 0V, f = 1MHz		880	1180	pF
C_{oss}	Output Capacitance			70	95	pF
C_{rss}	Reverse Transfer Capacitance			11	20	pF
Switching Characteristics (Note 2)						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 100V, I_D = 1A V_{GS} = 10V, R_{GS} = 2.4Ω		9	18	ns
t_r	Rise Time			13	23	ns
$t_{d(off)}$	Turn-Off Delay Time			15	27	ns
t_f	Fall Time			21	34	ns
Q_g	Total Gate Charge at 10V	V_{DD} = 15V, V_{GS} = 10V, I_D = 1A, I_G = 1.0mA		12.7	18	nC
Q_{gs}	Gate to Source Gate Charge			3.8		nC
Q_{gd}	Gate to Drain Charge			2.9		nC
Drain-Source Diode Characteristics						
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0V, I_S = 1A		0.8	1.5	V
t_{rr}	Reverse Recovery Time	I_F = 1A, di/dt = 100A/μs			60	ns
Q_{rr}	Reverse Recovery Charge	I_F = 1A, di/dt = 100A/μs			109	nC

Notes:

1: $R_{\theta JA}$ is determined with the device mounted on a 1in^2 oz.copper pad on a 1.5x1.5 in board of FR-4 material .$R_{\theta JC}$ are guaranteed by design while $R_{\theta JA}$ is determined by the user's board design.



a. 52°C/W when mounted on a 1 in^2 pad of 2 oz copper



b. 108°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} = 3A, V_{DD} = 50V, V_{GS} = 10V.

Typical Characteristics T_J = 25°C unless otherwise noted

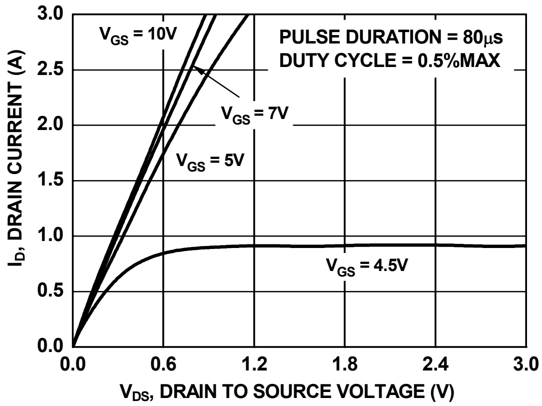


Figure 1. On Region Characteristics

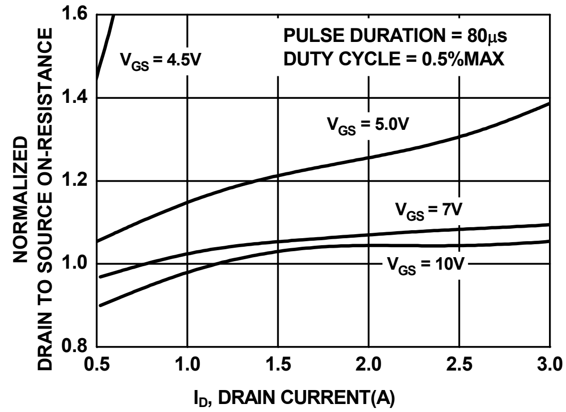


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

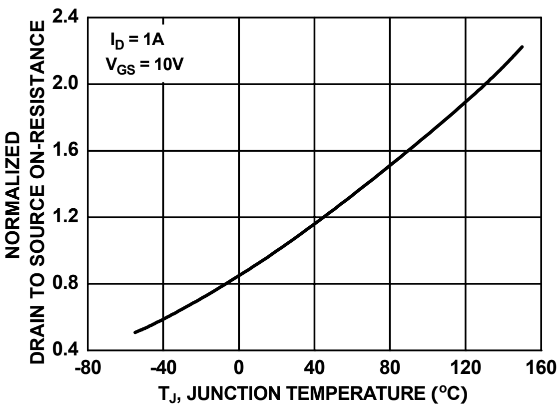


Figure 3. Normalized On Resistance vs Junction Temperature

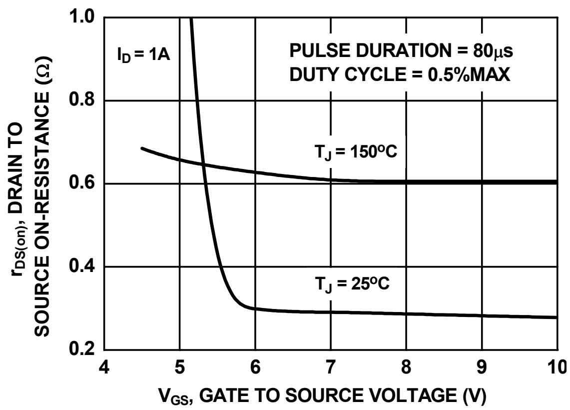


Figure 4. On-Resistance vs Gate to Source Voltage

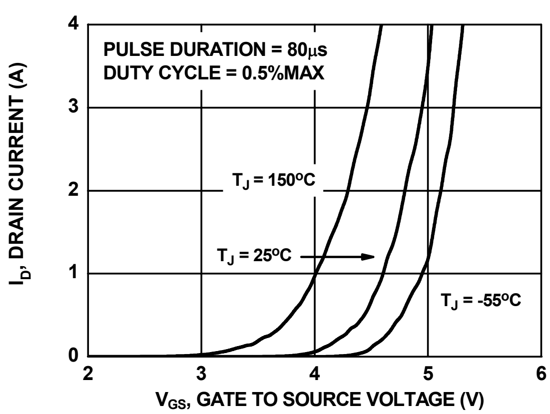


Figure 5. Transfer Characteristics

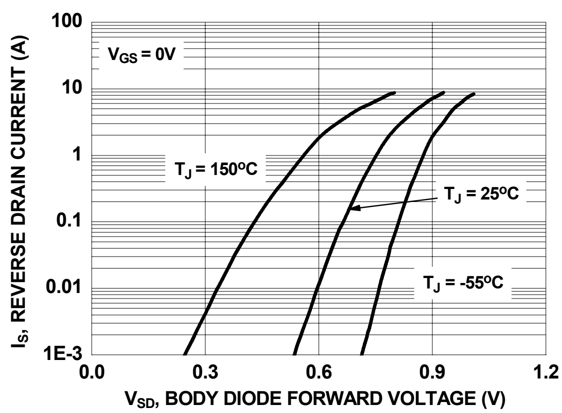


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics T_J = 25°C unless otherwise noted

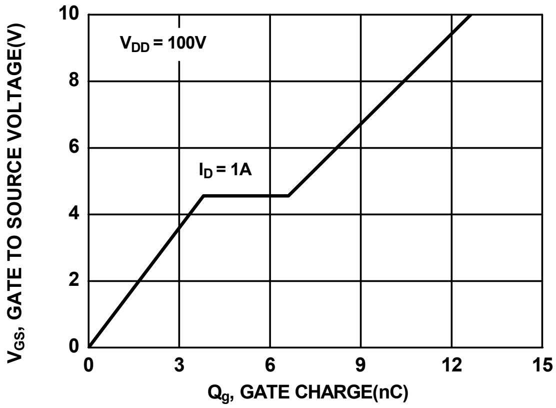


Figure 7. Gate Charge Characteristics

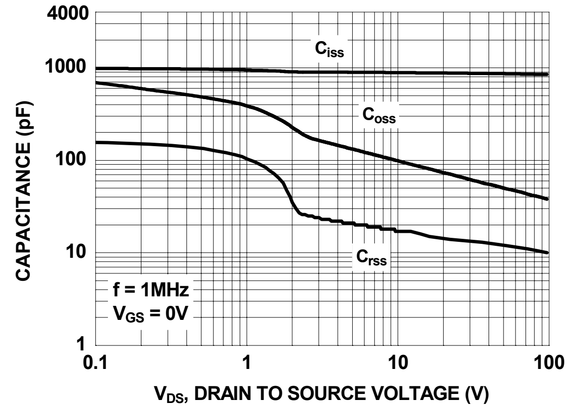


Figure 8. Capacitance vs Drain to Source Voltage

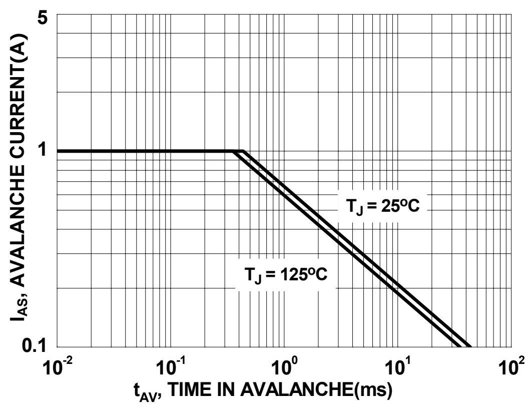


Figure 9. Unclamped Inductive Switching Capability

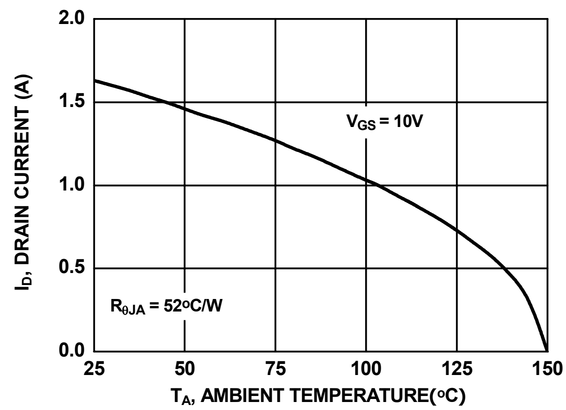


Figure 10. Maximum Continuous Drain Current vs Ambient Temperature

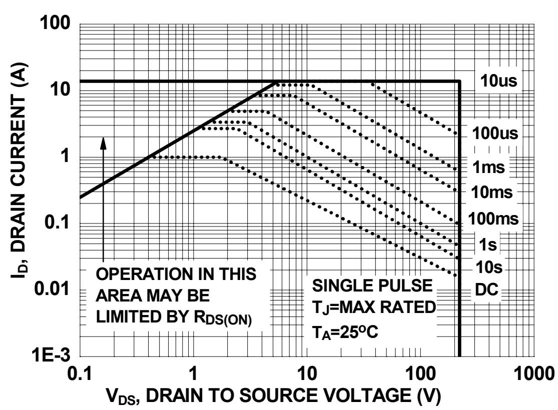


Figure 11. Forward Bias Safe Operating Area

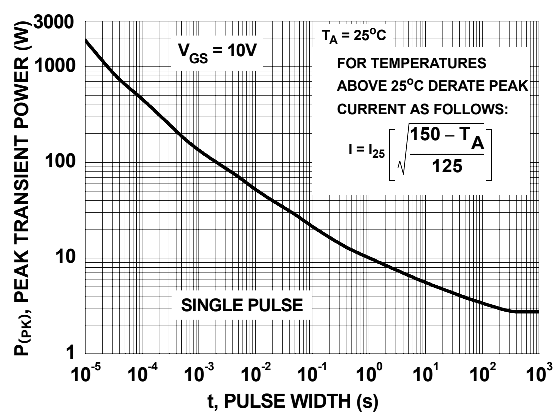


Figure 12. Single Pulse Maximum Power Dissipation

Typical Characteristics T_J = 25°C unless otherwise noted

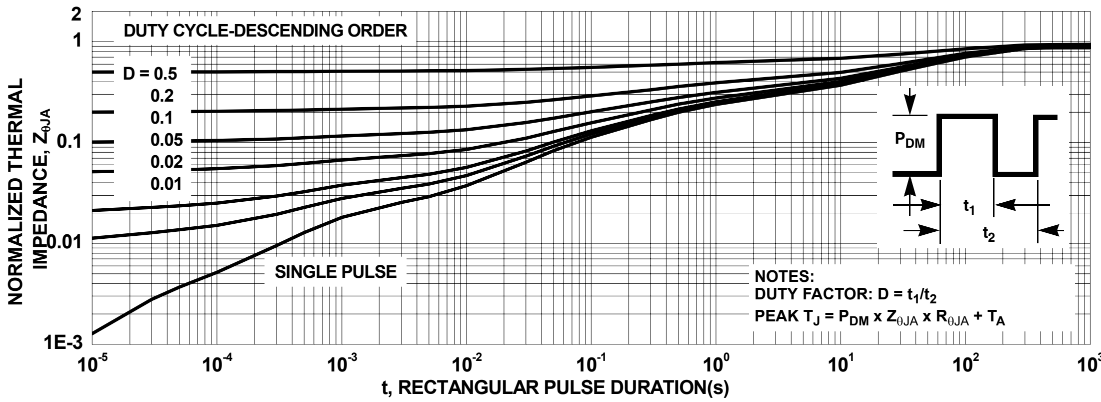


Figure 13. Transient Thermal Response Curve

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