FAIRCHILD SEMICONDUCTOR®

January 2007

FDMC2674
N-Channel UltraFET Trench MOSFET
220V, 7.0A, 366mΩ

Features

- Max $r_{DS(on)}$ = 366mΩ at V_{GS} = 10V, I_D = 1.0A
- 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

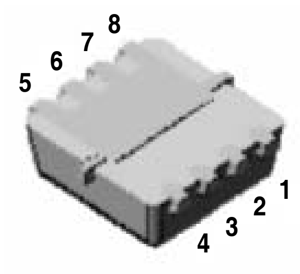
General Description

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.

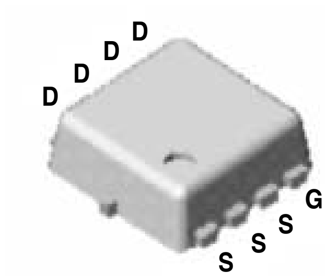
Application

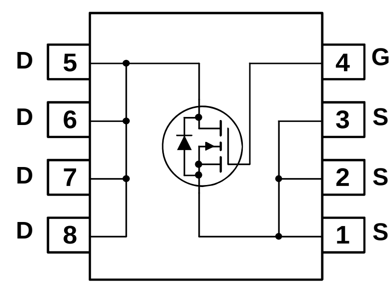
- DC/DC converters and Off-Line UPS
- Distributed Power Architectures

Bottom



Top





Power 33

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 (Silicon limited)	T_C= 25°C		7.0	A
	-Continuous	T_A = 25°C	(Note 1b)	1.0	
	-Pulsed			13.8	
P_D	Power Dissipation	T_C = 25°C		42	W
	Power Dissipation	T_A = 25°C	(Note 1a)	2.1	
T_J, T_{STG}	Operating and Storage Junction Temperature Range			-55 to +150	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	(Note 1)	3.0	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1a)	60	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMC2674	FDMC2674	Power 33	7''	8mm	3000 units

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	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, 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	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
$r_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10V, I_D = 1.0A		305	366	mΩ
		V_{GS} = 10V, I_D = 1.0A , T_J = 150°C		678	814	

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 100V, I_D = 1.0A V_{GS} = 10V, R_{GEN} = 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
$Q_{g(TOT)}$	Total Gate Charge at 10V	V_{GS} = 0V to 10V; V_{DD} = 15V, I_D = 1.0A		12.7	18	nC
Q_{gs}	Gate to Source Gate Charge			3.8		nC
Q_{gd}	Gate to Drain "Miller" Charge			2.9		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 = 2.2A (Note 2)		0.8	1.5	V
t_{rr}	Reverse Recovery Time	I_F = 1.0A, di/dt = 100A/μs			60	ns
Q_{rr}	Reverse Recovery Charge				109	nC

Notes:

1: $R_{\theta JA}$ is determined with the device mounted on a 1 in^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 $R_{\theta JA}$ is determined by the user's board design.
(a)$R_{\theta JA}$ = 60°C/W when mounted on a 1 in^2 pad of 2 oz copper, 1.5'x1.5'x0.062' thick PCB.
(b)$R_{\theta JA}$ = 135°C/W when mounted on a minimum pad of 2 oz copper.

a. 60°C/W when mounted on a 1 in^2 pad of 2 oz copper

b. 135°C/W when mounted on a minimum pad of 2 oz copper

2: Pulse Test: Pulse Width < 300μs, Duty cycle < 2.0%.

Typical Characteristics T_J = 25°C unless otherwise noted

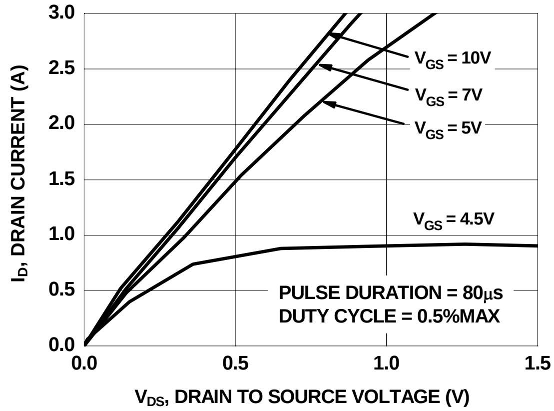


Figure 1. On-Region Characteristics

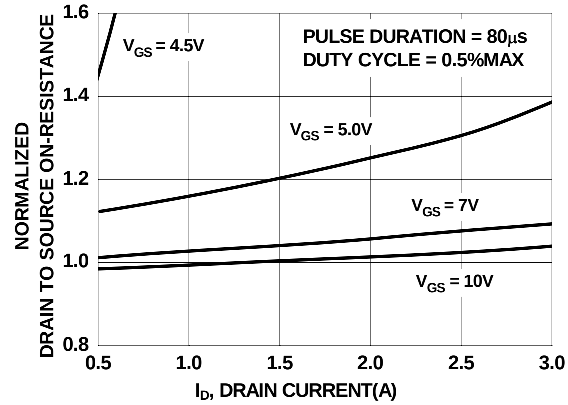


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

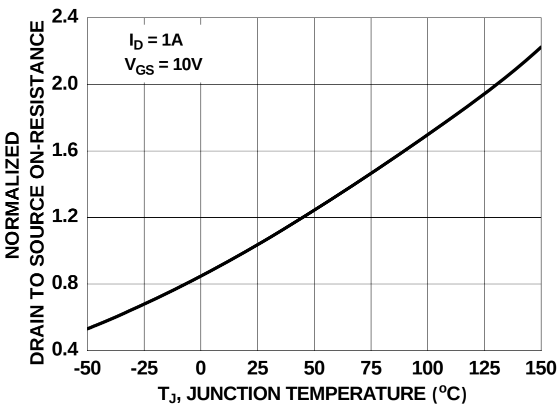


Figure 3. Normalized On-Resistance vs Junction Temperature

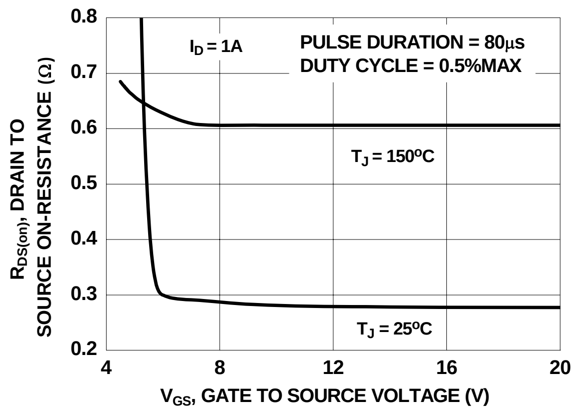


Figure 4. On-Resistance vs Gate to Source Voltage

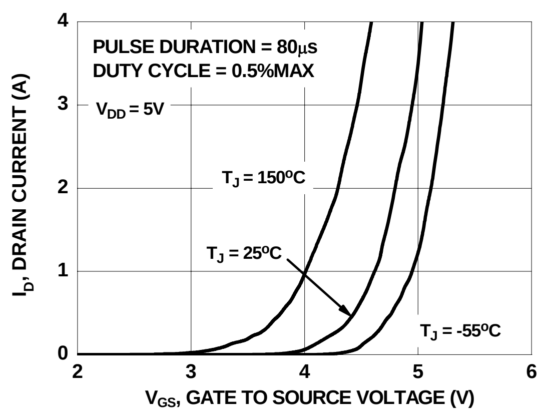


Figure 5. Transfer Characteristics

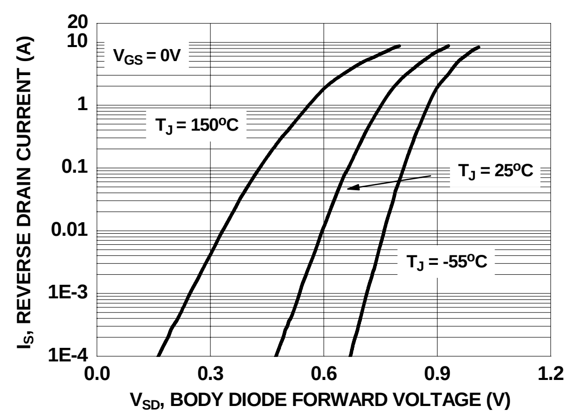


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics T_J = 25°C unless otherwise noted

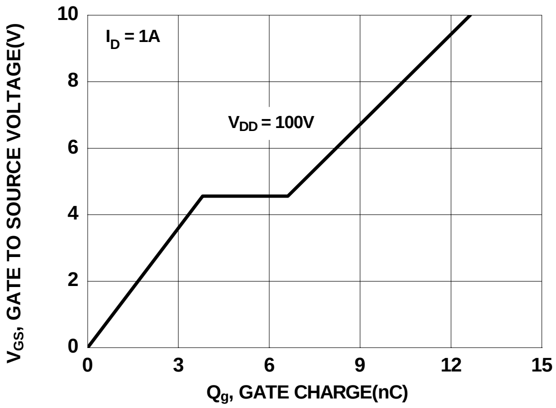


Figure 7. Gate Charge Characteristics

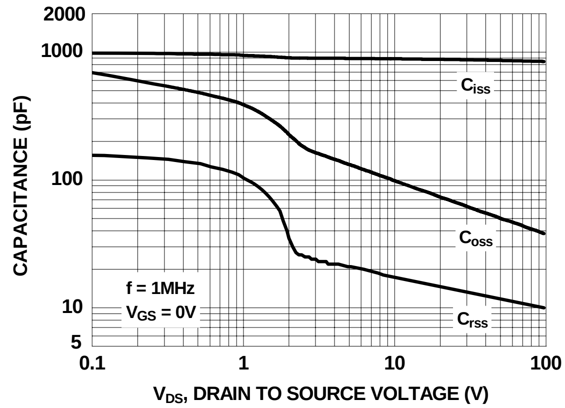


Figure 8. Capacitance vs Drain to Source Voltage

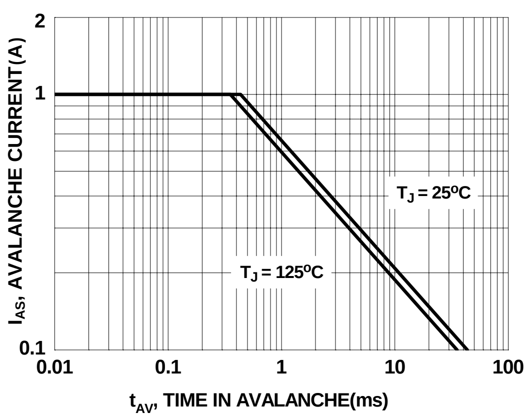


Figure 9. Unclamped Inductive Switching Capability

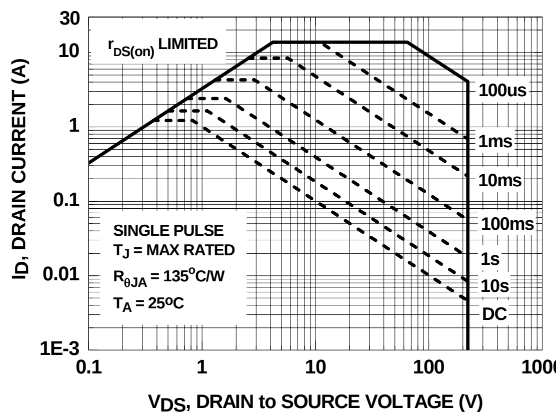


Figure 10. Forward Bias Safe Operating Area

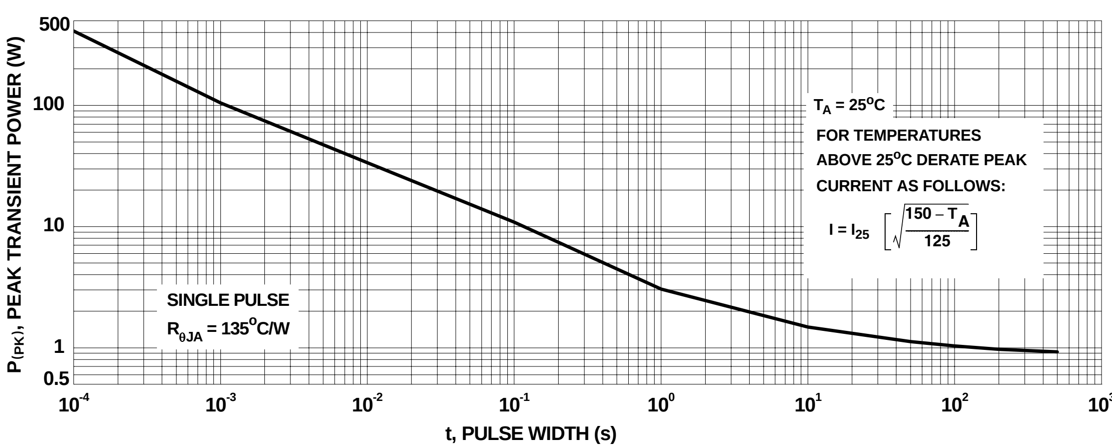


Figure 11. Single Pulse Maximum Power Dissipation

Typical Characteristics T_J = 25°C unless otherwise noted

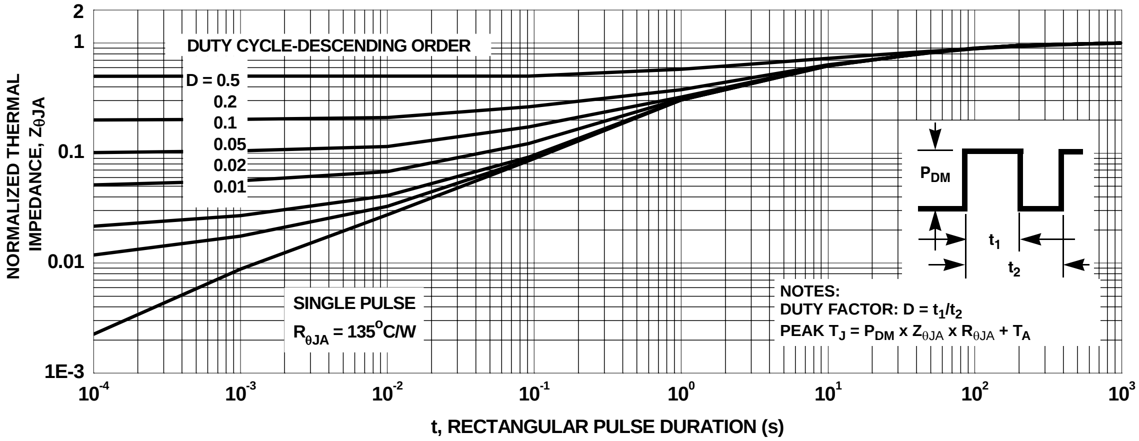
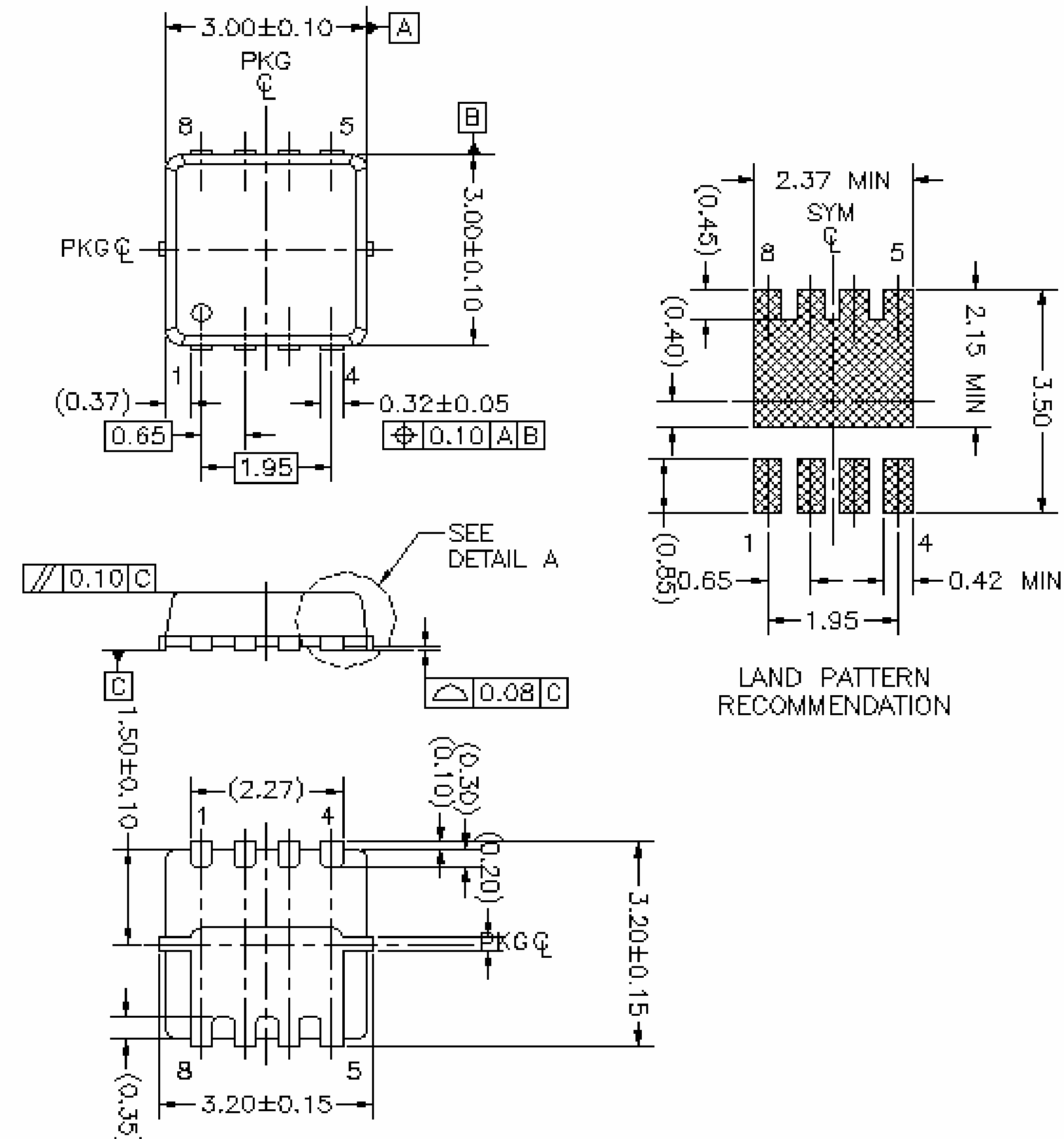
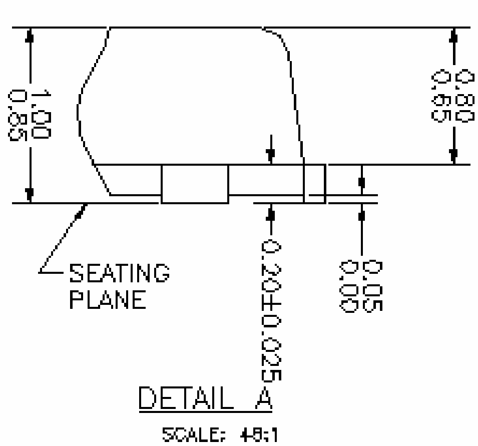


Figure 12. Transient Thermal Response Curve





NOTES: UNLESS OTHERWISE SPECIFIED

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