FAIRCHILD™

September 2014

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

Top

8 7 6 5

1 2 3 4

Bottom

D D D D

G S S S

MLP 3.3x3.3

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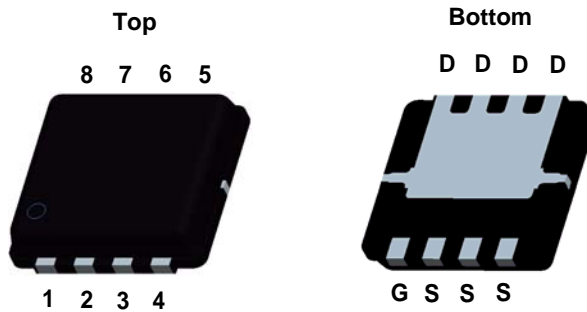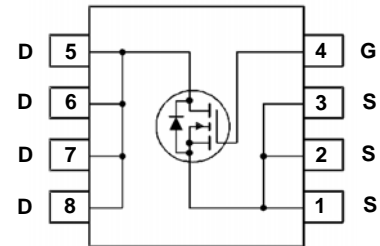
MOSFET Maximum Ratings T_A = 25°C unless otherwise noted

Symbol	Parameter			Ratings	Units
V_{DS}	Drain to Source Voltage			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	
E_{AS}	Single Pulse Avalanche Energy		(Note 3)	11	mJ
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	MLP 3.3X3.3	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	$I_D = 250\mu A$, $V_{GS} = 0V$	220			V
$\dfrac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\mu A$, 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	$V_{GS} = \pm20V$, $V_{DS} = 0V$			±100	nA
On Characteristics						
$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 250\mu A$	2	3.4	4	V
$\dfrac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250\mu A$, 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	$m\Omega$
		$V_{GS} = 10V$, $I_D = 1.0A$, $T_J = 150°C$		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						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 100V$, $I_D = 1.0A$ $V_{GS} = 10V$, $R_{GEN} = 2.4\Omega$		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						
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.
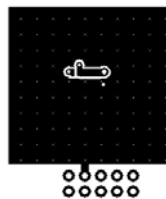
a. 60°C/W when mounted on a
1 in^2 pad of 2 oz copper

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

2: Pulse Test: Pulse Width < 300μs, Duty cycle < 2.0%.
3: Starting $T_J = 25°C$; N-ch: L = 1mH, $I_{AS} = 4.7A$, $V_{DD} = 25V$, $V_{GS} = 10V$.

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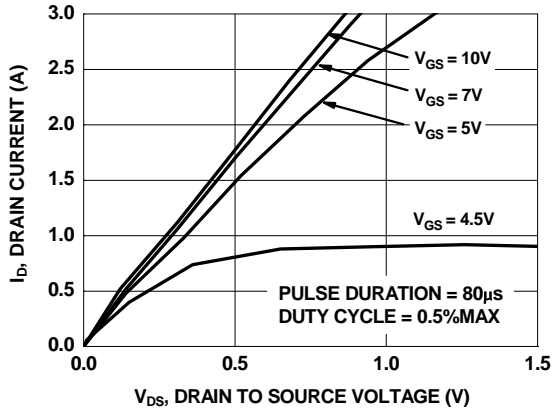

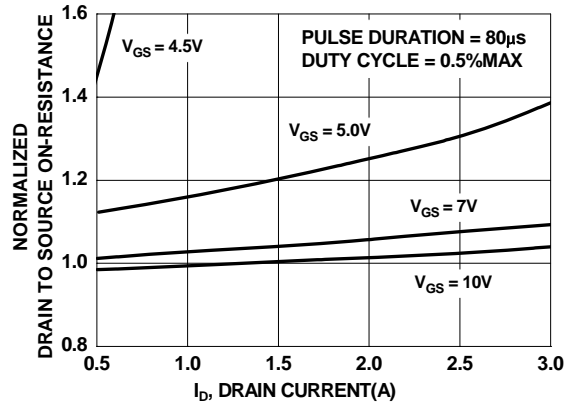Figure 1. On-Region Characteristics

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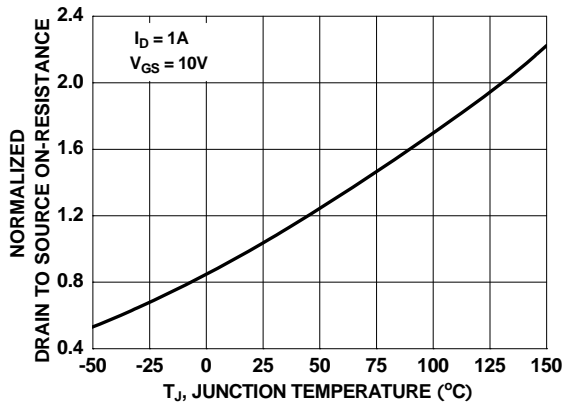vs Drain Current and Gate Voltage

Figure 3. Normalized On-Resistance
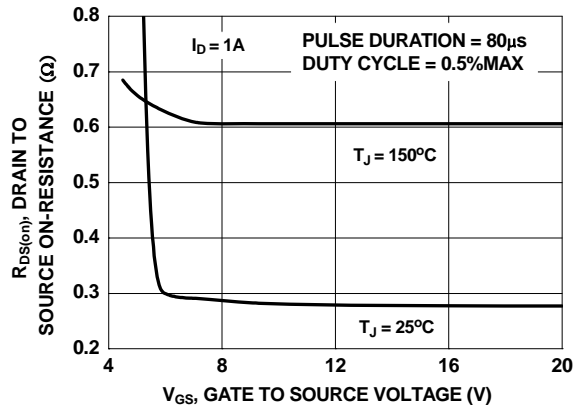vs Junction Temperature

Figure 4. On-Resistance vs Gate to
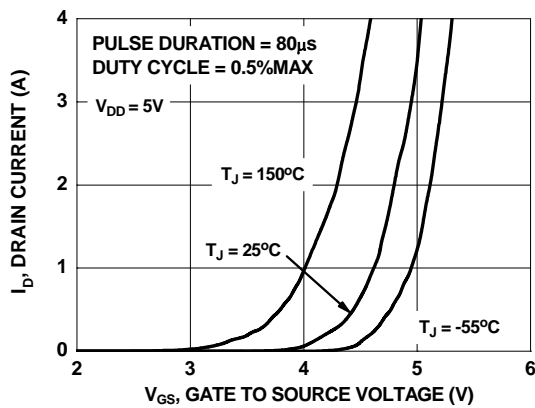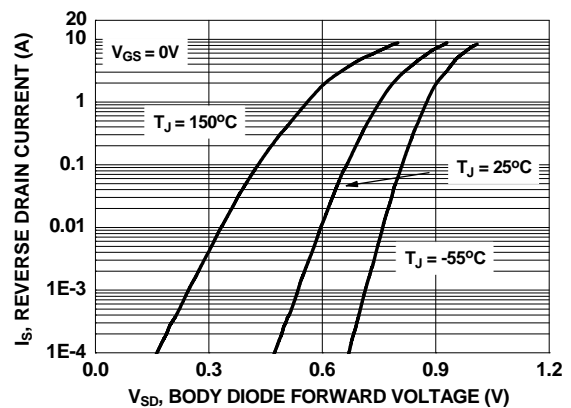Source Voltage

Figure 5. Transfer Characteristics

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

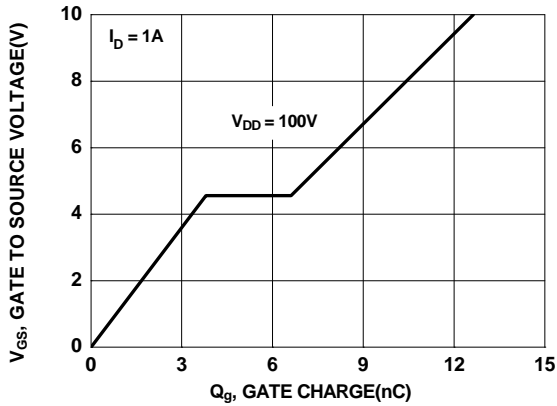**Typical Characteristics** T_J = 25°C unless otherwise noted

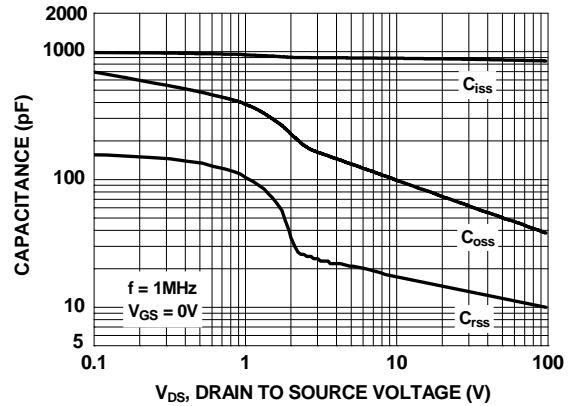Figure 7. Gate Charge Characteristics

Figure 8. Capacitance vs Drain
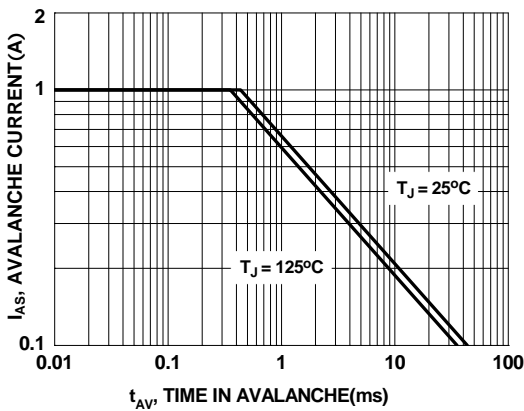to Source Voltage

Figure 9. Unclamped Inductive
Switching Capability
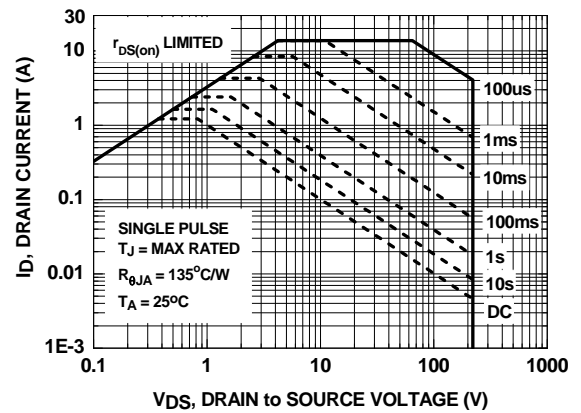
Figure 10. Forward Bias Safe
Operating Area
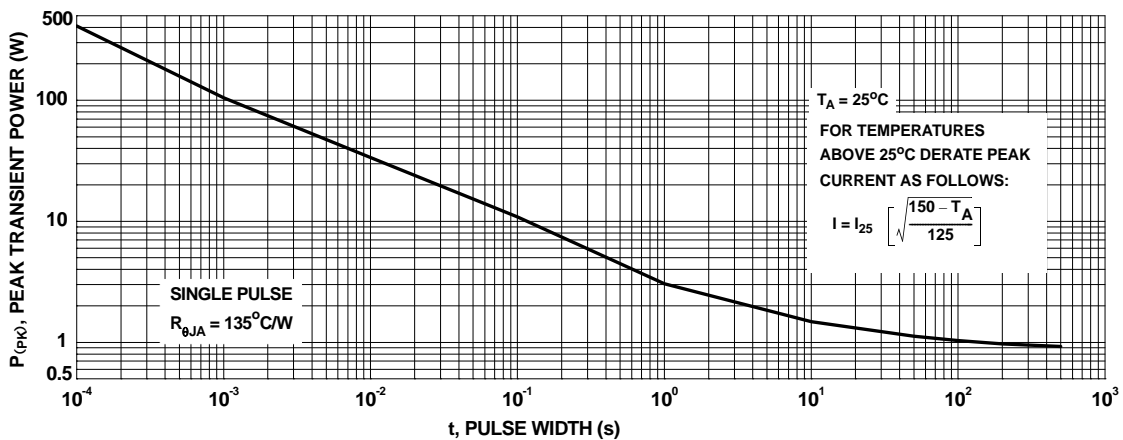
Figure 11. Single Pulse Maximum Power Dissipation

Typical Characteristics T_J = 25°C unless otherwise noted

r(t), NORMALIZED EFFECTIVE TRANSIENT THERMAL RESISTANCE

DUTY CYCLE-DESCENDING ORDER

D = 0.5
0.2
0.1
0.05
0.02
0.01

SINGLE PULSE

t, RECTANGULAR PULSE DURATION (s)

NOTES:

$Z_{\theta JA}(t) = r(t) \times R_{\theta JA}$
$R_{\theta JA} = 135\ ^oC/W$
Peak $T_J = P_{DM} \times Z_{\theta JA}(t) + T_A$
Duty Cycle, $D = t_1 / t_2$

P_{DM}

t_1

t_2
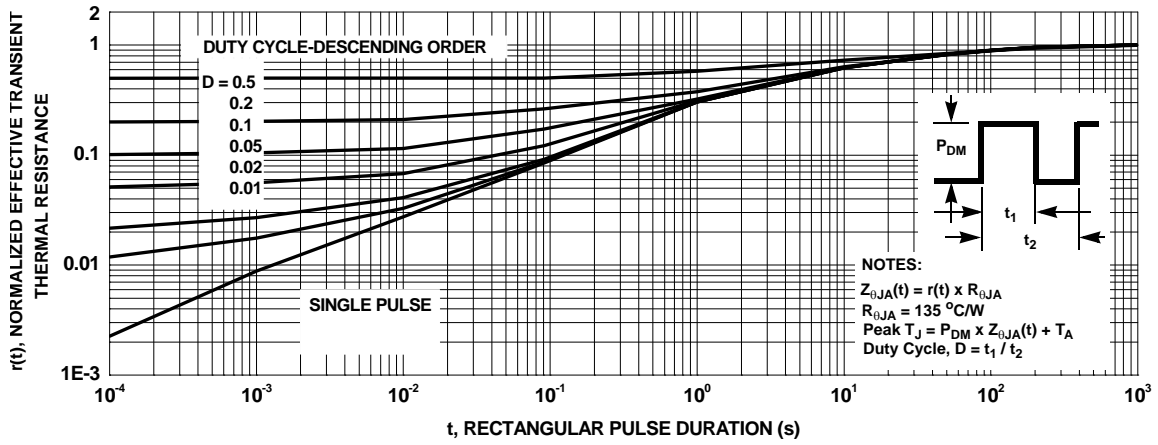
Figure 12. Transient Thermal Response Curve

TOP VIEW

2X △ 0.05 C

3.30 → A B

3.30

△ 0.05 C
2X

PIN#1 IDENT

SIDE VIEW

// 0.10 C

0.75±0.05

△ 0.08 C

0.15±0.05

0.025±0.025
SEATING
PLANE

C

BOTTOM VIEW

3.30±0.05

2.27±0.05

(0.50)4X

PIN #1 IDENT

(0.79)

0.50±0.05(4X)

1   4

(0.35)

(1.15)

3.30±0.05

R0.15

2.00±0.05

0.30±0.05(3X)

8   5

0.65

0.35±0.05(8X)

1.95

⊕ 0.10(M) C A B

0.05(M) C

RECOMMENDED LAND PATTERN

(3.40)

2.37

0.45(4X)

8   5

2.15

(1.70)

(0.40)

(0.65)

KEEP OUT
AREA

0.70(4X)

0.65   1   4   0.42(8X)

1.95
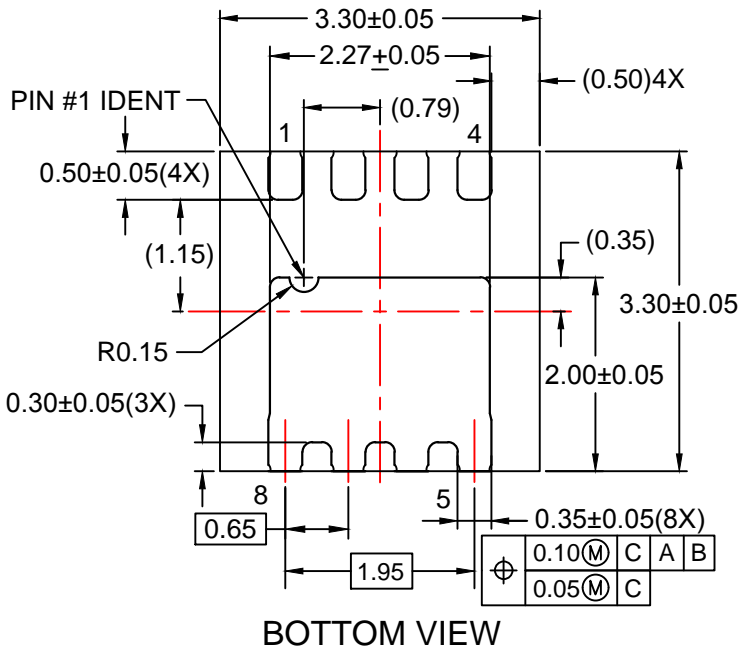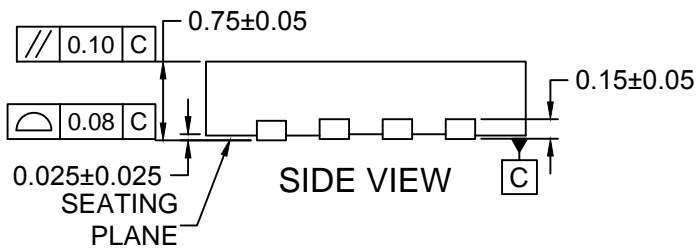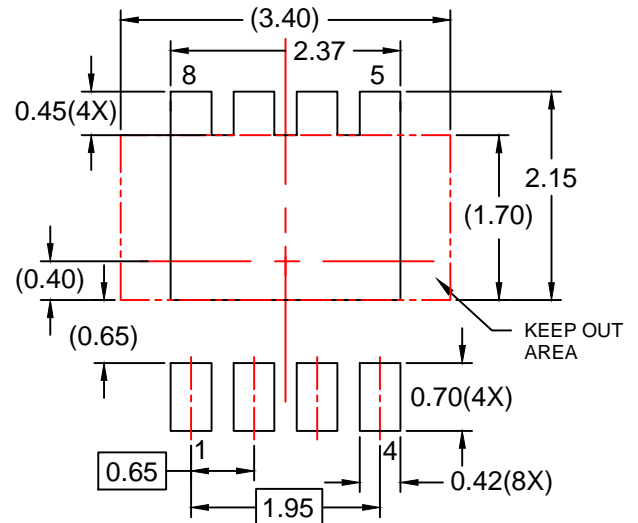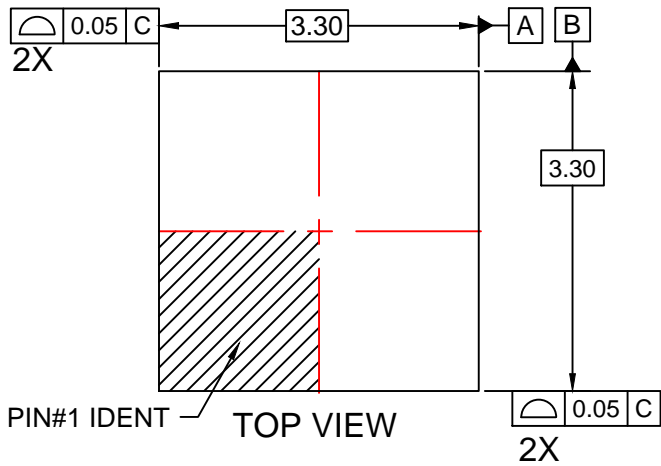
NOTES:

A. DOES NOT CONFORM TO JEDEC
   REGISTRATION MO-229

B. DIMENSIONS ARE IN MILLIMETERS.

C. DIMENSIONS AND TOLERANCES PER
   ASME Y14.5M, 2009.

D. LAND PATTERN RECOMMENDATION IS
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