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FAIRCHILD
SEMICONDUCTOR®

FDMS3572
N-Channel UltraFET Trench® MOSFET

80V, 22A, 16.5mΩ

Features

- Max $r_{DS(on)}$ = 16.5mΩ at V_{GS} = 10V, I_D = 8.8A

- Max $r_{DS(on)}$ = 24mΩ at V_{GS} = 6V, I_D = 8.4A

- Typ Qg = 28nC at V_{GS} = 10V

- Low Miller Charge

- Optimized efficiency at high frequencies
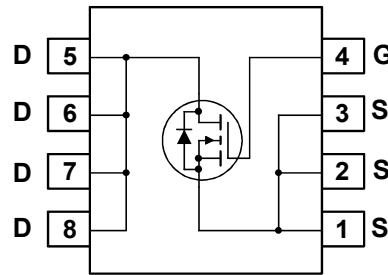
- RoHS Compliant

General Description

UltraFET devices combine 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 Conversion

Pin 1 → S S S G

D D D D
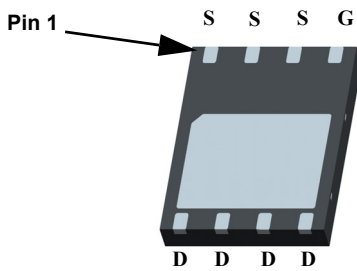
Power 56 (Bottom view)

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			80	V
V_{GS}	Gate to Source Voltage			±20	V
I_D	Drain Current -Continuous (Package limited)	T_C = 25°C		22	A
	-Continuous (Silicon limited)	T_C = 25°C		48	
	-Continuous	T_A = 25°C	(Note 1a)	8.8	
	-Pulsed			50	
P_D	Power Dissipation	T_C = 25°C		78	W
	Power Dissipation	T_A = 25°C	(Note 1a)	2.5	
T_J, T_{STG}	Operating and Storage Junction Temperature Range			-55 to +150	°C

Thermal Characteristics

			Ratings	
$R_{\theta JC}$	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
FDMS3572	FDMS3572	Power 56	13''	12mm	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	80			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250μA, referenced to 25°C		76		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 64V, 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	3.2	4	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250μA, referenced to 25°C		-11		mV/°C
$r_{DS(on)}$	Drain to Source On Resistance	V_{GS} = 10V, I_D = 8.8A		13.5	16.5	mΩ
		V_{GS} = 6V, I_D = 8.4A		18.3	24	
		V_{GS} = 10V, I_D = 8.8A, T_J = 125°C		22.2	29	
g_{FS}	Forward Transconductance	V_{DS} = 10V, I_D = 8.8A		23		S

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
C_{iss}	Input Capacitance	V_{DS} = 40V, V_{GS} = 0V, f = 1MHz		1870	2490	pF
C_{oss}	Output Capacitance			275	365	pF
C_{rss}	Reverse Transfer Capacitance			78	120	pF
R_g	Gate Resistance	f = 1MHz		1.3		Ω

Switching Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 40V, I_D = 8.8A V_{GS} = 10V, R_{GEN} = 6Ω		11	20	ns
t_r	Rise Time			13	24	ns
$t_{d(off)}$	Turn-Off Delay Time			24	39	ns
t_f	Fall Time			12	22	ns
$Q_{g(TOT)}$	Total Gate Charge at 10V	V_{GS} = 0V to 10V, V_{DD} = 40V, I_D = 8.8A		28	40	nC
Q_{gs}	Gate to Source Gate Charge			9		nC
Q_{gd}	Gate to Drain "Miller" Charge			8		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 = 8.8A (Note 2)		0.8	1.2	V
t_{rr}	Reverse Recovery Time	I_F = 8.8A, di/dt = 100A/μs		43	65	ns
Q_{rr}	Reverse Recovery Charge			71	107	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.
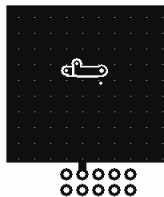
a. 50°C/W when mounted on a 1 in^2 pad of 2 oz copper
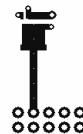
b. 125°C/W when mounted on a minimum pad of 2 oz copper

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

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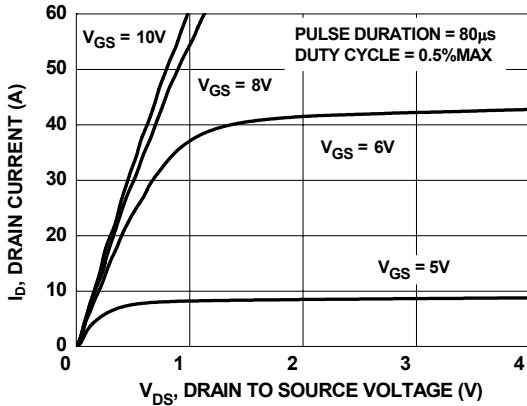

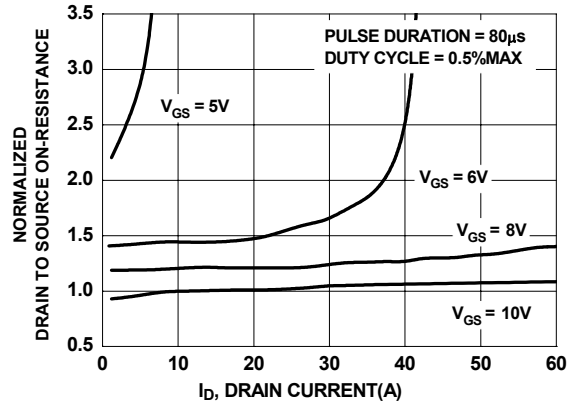Figure 1. On Region Characteristics

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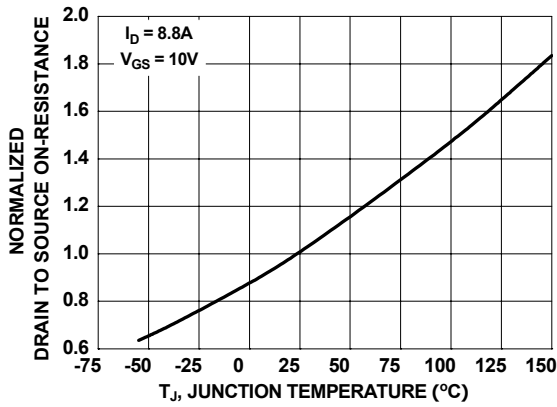vs Drain Current and Gate Voltage

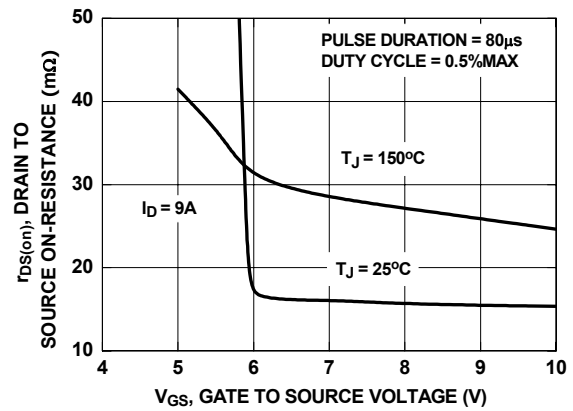Figure 3. Normalized On Resistance
vs Junction Temperature

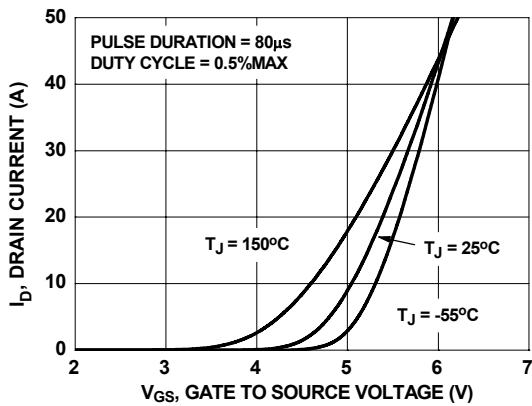Figure 4. On-Resistance vs Gate to
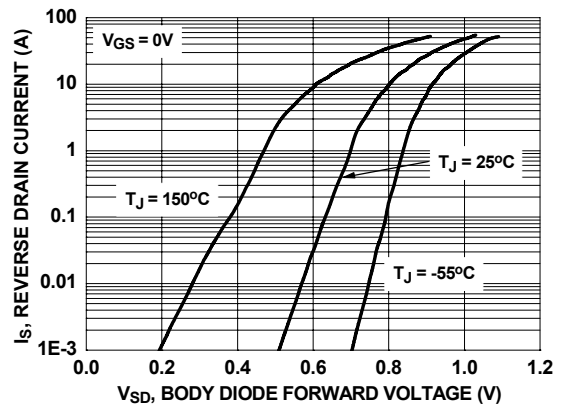Source Voltage

Figure 5. Transfer Characteristics

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

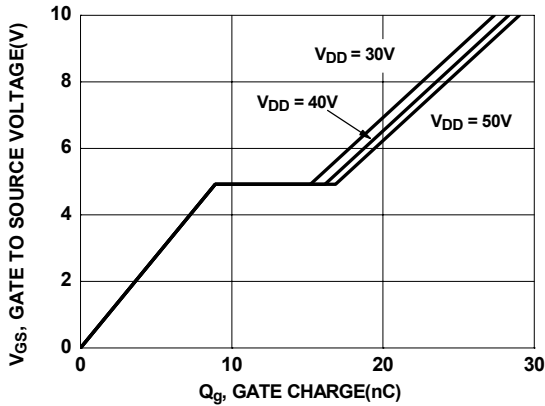## Typical Characteristics T_J = 25°C unless otherwise noted

Figure 7. Gate Charge Characteristics
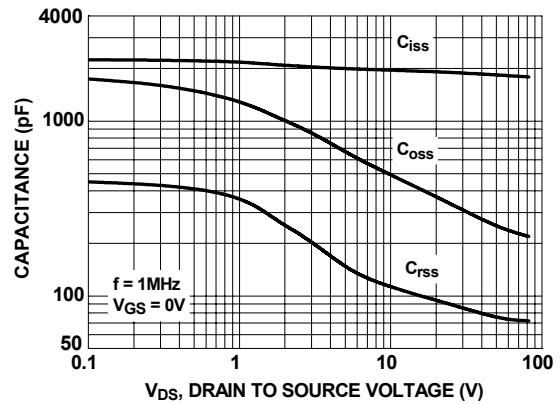
Figure 8. Capacitance vs Drain
to Source Voltage
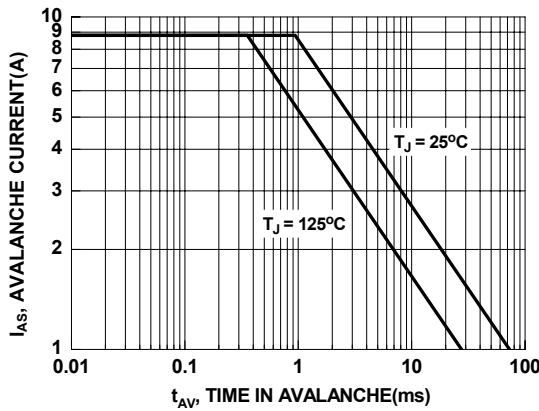
Figure 9. Unclamped Inductive
Switching Capability
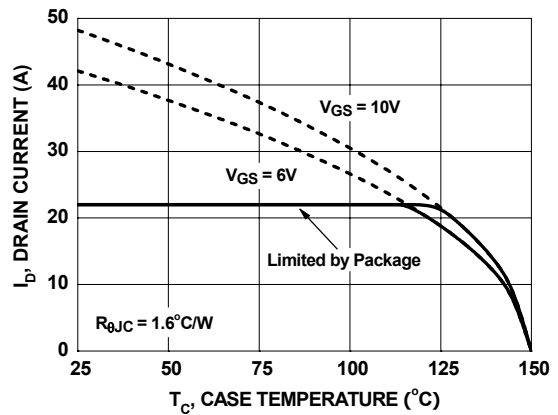
Figure 10. Maximum Continuous Drain
Current vs Case Temperature
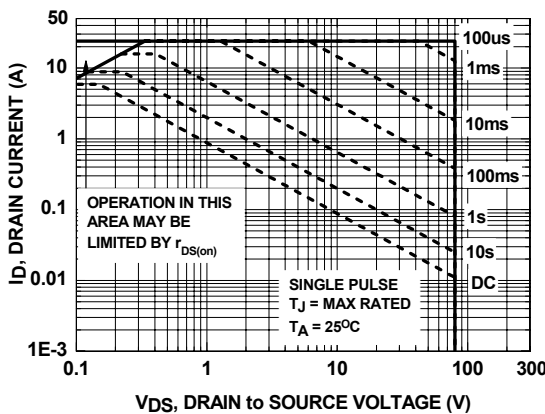
Figure 11. Forward Bias Safe
Operating Area
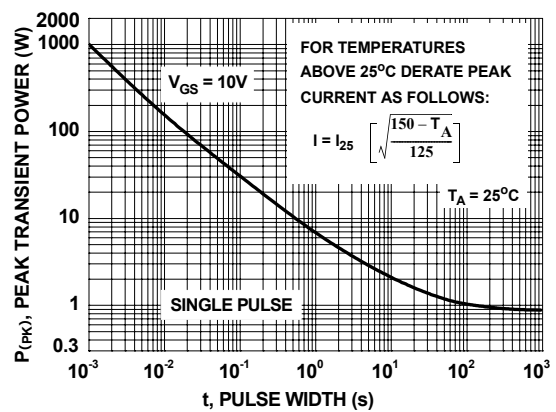
Figure 12. Single Pulse Maximum
Power Dissipation

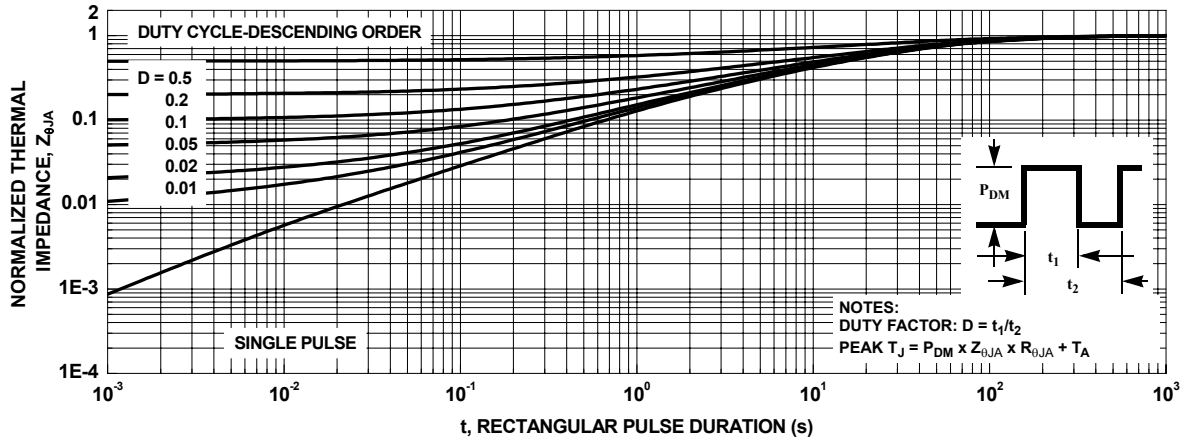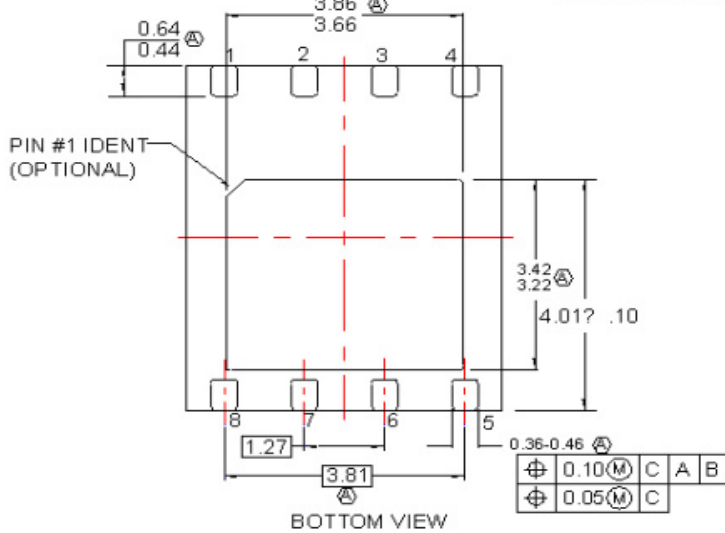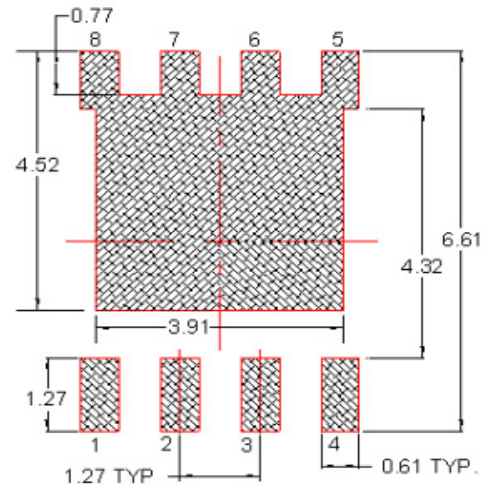**Typical Characteristics** T_J = 25°C unless otherwise noted

Figure 13. Transient Thermal Response Curve

Graph labels:
- NORMALIZED THERMAL IMPEDANCE, $Z_{\theta JA}$
- 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:
DUTY FACTOR: D = t_1/t_2
PEAK T_J = P_{DM} x $Z_{\theta JA}$ x $R_{\theta JA}$ + T_A

P_{DM}, t_1, t_2

TOP VIEW

0.10 C
2X

5.0

A
B

6.0

0.10 C
2X

PIN #1 IDENT

—0.77
8 7 6 5

4.52

6.61

4.32

3.91

1.27

1 2 3 4

1.27 TYP

0.61 TYP.

RECOMMENDED LAND PATTERN

// 0.10 C

0.8 MAX

(0.25)

0.08 C

0.05
0.00

C

SIDE VIEW

SEATING PLANE

3.86 Ⓐ
3.66

0.64 Ⓐ
0.44

1 2 3 4

PIN #1 IDENT
(OPTIONAL)

3.42 Ⓐ
3.22

4.01? .10

8 7 6 5

1.27

0.36-0.46 Ⓐ

3.81
Ⓐ

⊕ 0.10 Ⓜ C A B
⊕ 0.05 Ⓜ C

BOTTOM VIEW

NOTES:

Ⓐ DOES NOT FULLY CONFORM TO JEDEC REGISTRATION,
   MO-229. DATED 11/2001.

B. DIMENSIONS ARE IN MILLIMETERS.

C. DIMENSIONS AND TOLERANCES PER
   ASME Y14.5M, 1994

D. TERMINALS 5,6,7 AND 8 ARE TIED
   TO THE EXPOSED PADDLE

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The Power Franchise®   ScalarPump™   UHC®

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No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
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