



December 2005

FDMC3300NZA

Monolithic Common Drain N-Channel 2.5V Specified PowerTrench[®] MOSFET

8A, 20V, 26mΩ

General Description

This Dual N-Channel MOSFET has been designed using Fairchild Semiconductor's advanced Power Trench process to optimize the $R_{DS(on)}$ @ $V_{GS}=2.5V$ on special MicroFET leadframe with all the drains on one side of the package.

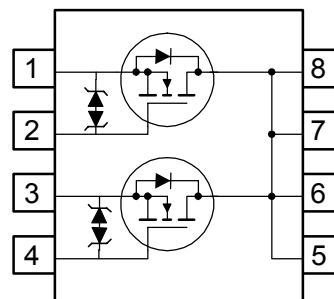
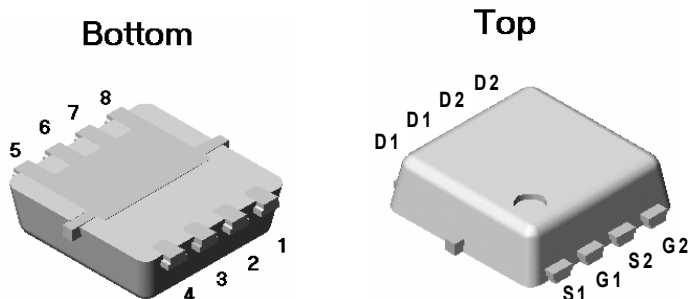
Applications

- Li-Ion Battery Pack



Features

- $R_{DS(on)} = 26m\Omega$ @ $V_{GS} = 4.5V$, $I_D = 8A$
- $R_{DS(on)} = 34m\Omega$ @ $V_{GS} = 2.5V$, $I_D = 7A$
- >2000V ESD protection
- Low Profile-1mm maximum in the new package MicroFET 3.3x3.3 mm
- Pb-free and RoHS Compliant



Absolute Maximum Ratings $T_A = 25^\circ C$ unless otherwise noted

Symbol	Parameter	Rated	Units
V_{DSS}	Drain-Source Voltage	20	V
V_{GSS}	Gate-Source Voltage	± 12	V
I_D	Drain Current -Continuous -Pulsed	(Note 1a)	8
			40
P_D	Power dissipation (Steady State)	(Note 1a)	2.4
T_J, T_{STG}	Operating and Storage Junction Temperature Range		-55 to +150

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1a)	52	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1b)	108	
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	(Note 1)	5	

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape Width	Quantity
3300A	FDMC3300NZA	7"	12mm	3000 units

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

B_{VDSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	20	-	-	V
$\frac{\Delta B_{VDSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\mu A$, Referenced to 25°C	-	12.0	-	mV/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 16V, V_{GS} = 0V$,	-	-	1	μA
I_{GSS}	Gate-Body Leakage,	$V_{GS} = \pm 12V, V_{DS} = 0V$	-	-	± 10	μA

On Characteristics (Note 2)

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	0.6	-	1.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = 250\mu A$, Referenced to 25°C	-	-3.1	-	mV/ $^\circ\text{C}$
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 4.5V, I_D = 8A$	-	20	26	m Ω
		$V_{GS} = 2.5V, I_D = 7A$	-	25	34	
		$V_{GS} = 4.5V, I_D = 8A$, $T_J = 150^\circ\text{C}$	-	29	38	
g_{FS}	Forward Transconductance	$V_{DS} = 5V, I_D = 8A$	-	29	-	S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 10V, V_{GS} = 0V$, $f = 1.0\text{MHz}$	-	610	-	pF
C_{oss}	Output Capacitance		-	165	-	pF
C_{rss}	Reverse Transfer Capacitance		-	115	-	pF
R_G	Gate Resistance	$f = 1.0\text{MHz}$	-	1.7	-	Ω

Switching Characteristics (Note 2)

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 10V, I_D = 1A$ $V_{GS} = 4.5V, R_{GEN} = 6\Omega$	-	8	16	ns
t_r	Turn-On Rise Time		-	8	16	ns
$t_{d(off)}$	Turn-Off Delay Time		-	19	34	ns
t_f	Turn-Off Fall Time		-	9	18	ns
Q_g	Total Gate Charge	$V_{DS} = 10V, I_D = 8A$, $V_{GS} = 4.5V$	-	8	-	nC
Q_{gs}	Gate-Source Charge		-	1	-	nC
Q_{gd}	Gate-Drain Charge		-	2	-	nC

Drain-Source Diode Characteristics and Maximum Ratings

V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0V, I_S = 2A$ (Note 2)	-	0.7	1.2	V
t_{rr}	Diode Reverse Recovery Time	$I_F = 8A$,	-	-	21	ns
Q_{rr}	Diode Reverse Recovery Charge	$di_F/dt = 100A/\mu s$	-	-	6	nC

Notes:

- $R_{\theta JA}$ is determined with the device mounted on a 1in^2 oz. copper pad on a 1.5×1.5 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 1in^2 pad of 2 oz



b. 108°C/W when mounted on a minimum pad of 2 oz copper

- Pulse Test: Pulse Width < $300\mu s$, Duty Cycle < 2.0%

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

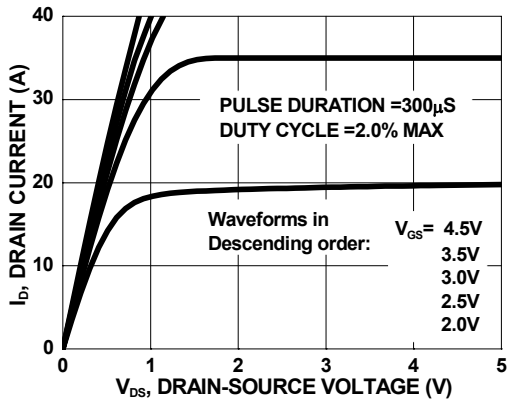


Figure 1. On Region Characteristics

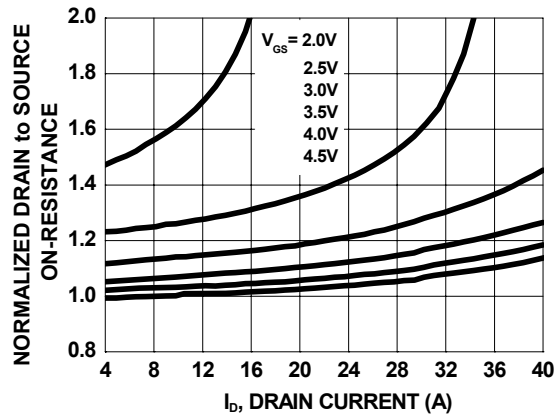


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage

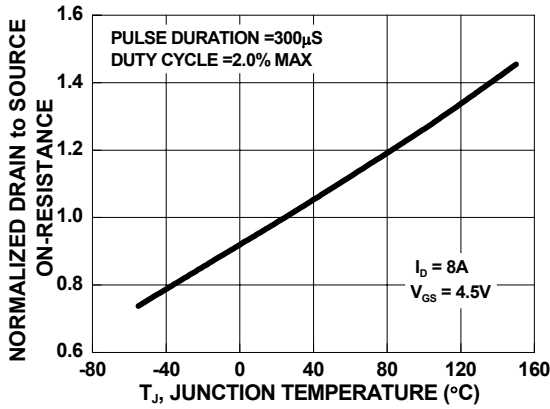


Figure 3. On Resistance Variation with Temperature

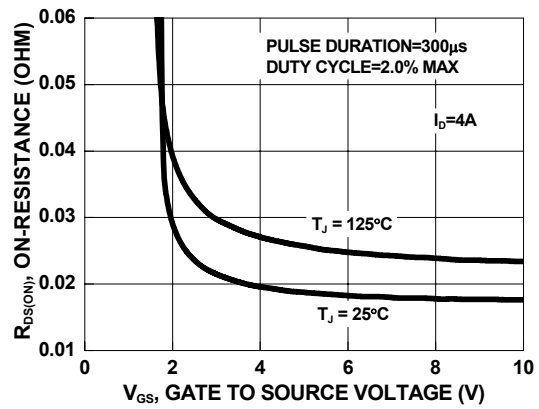


Figure 4. On-Resistance Variation with Gate-to-Source Voltage

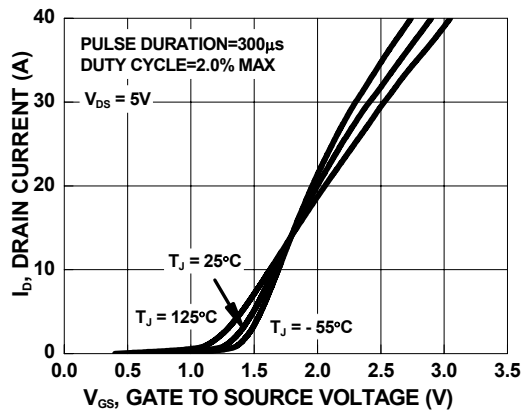


Figure 5. Transfer Characteristics

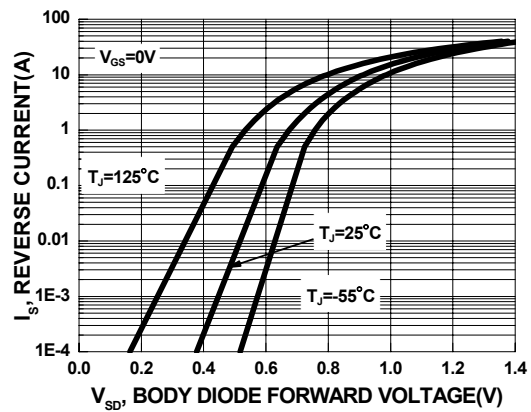


Figure 6. Body Diode Forward Voltage Variation With Source Current and Temperature

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

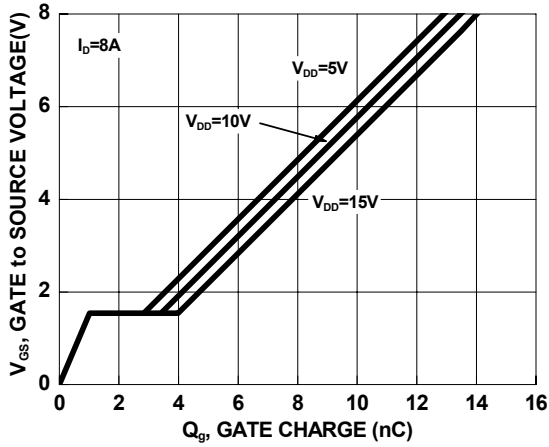


Figure 7. Gate Charge Characteristics

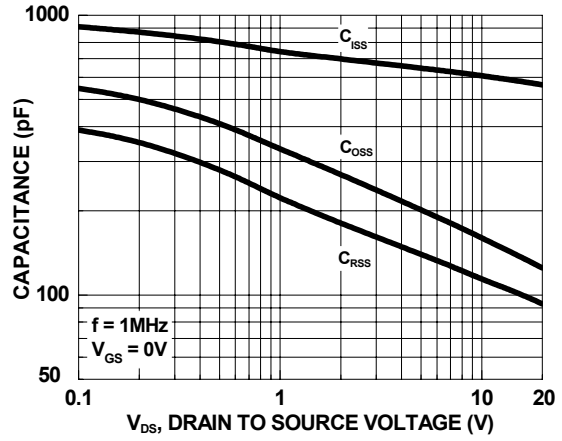


Figure 8. Capacitance Characteristics

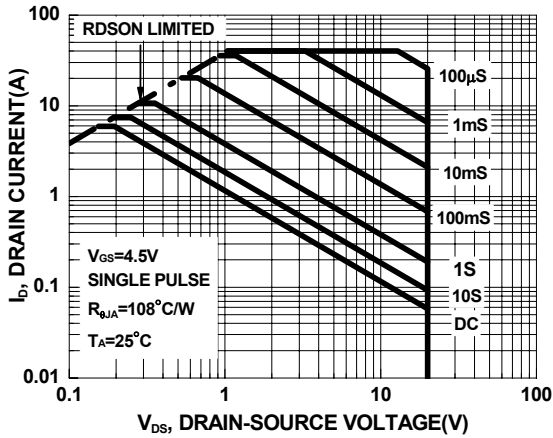


Figure 9. Safe Operating Area

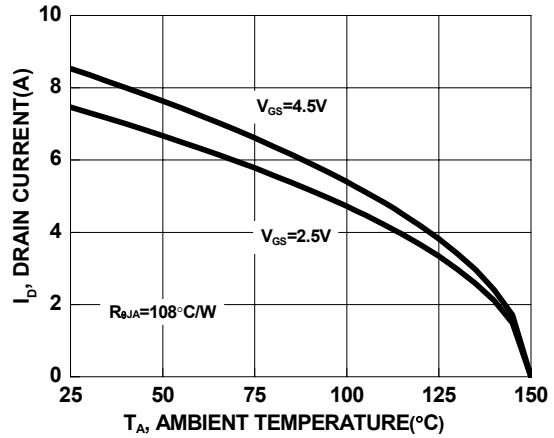


Figure 10. Maximum Continuous Drain Current vs Ambient Temperature

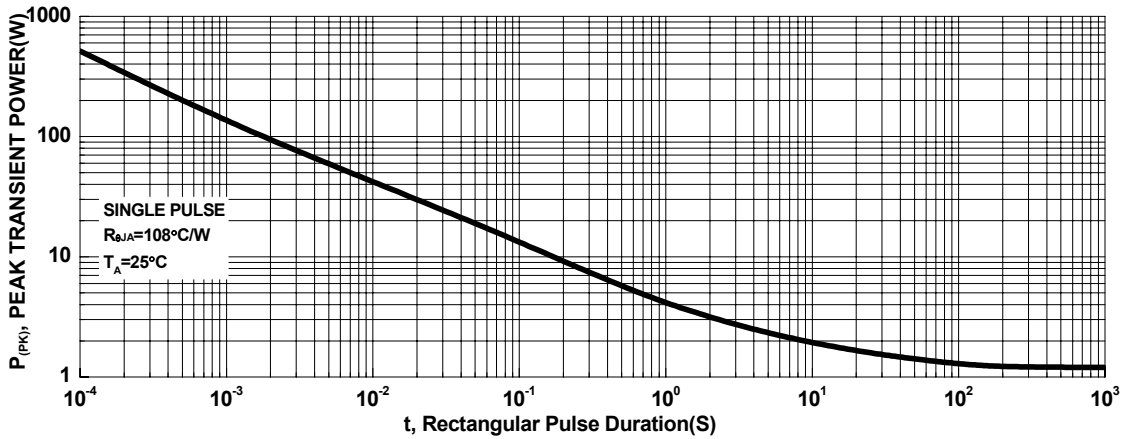


Figure 11. Single Maximum Power Dissipation

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

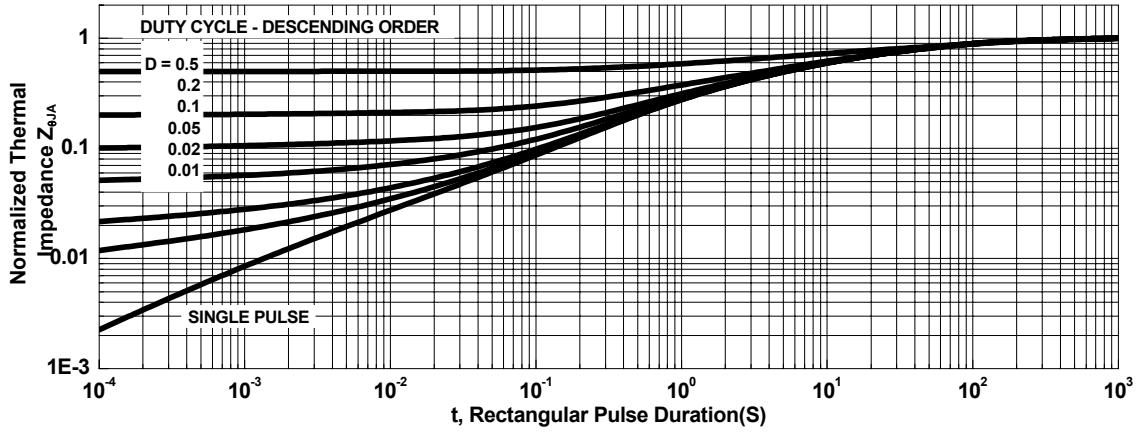
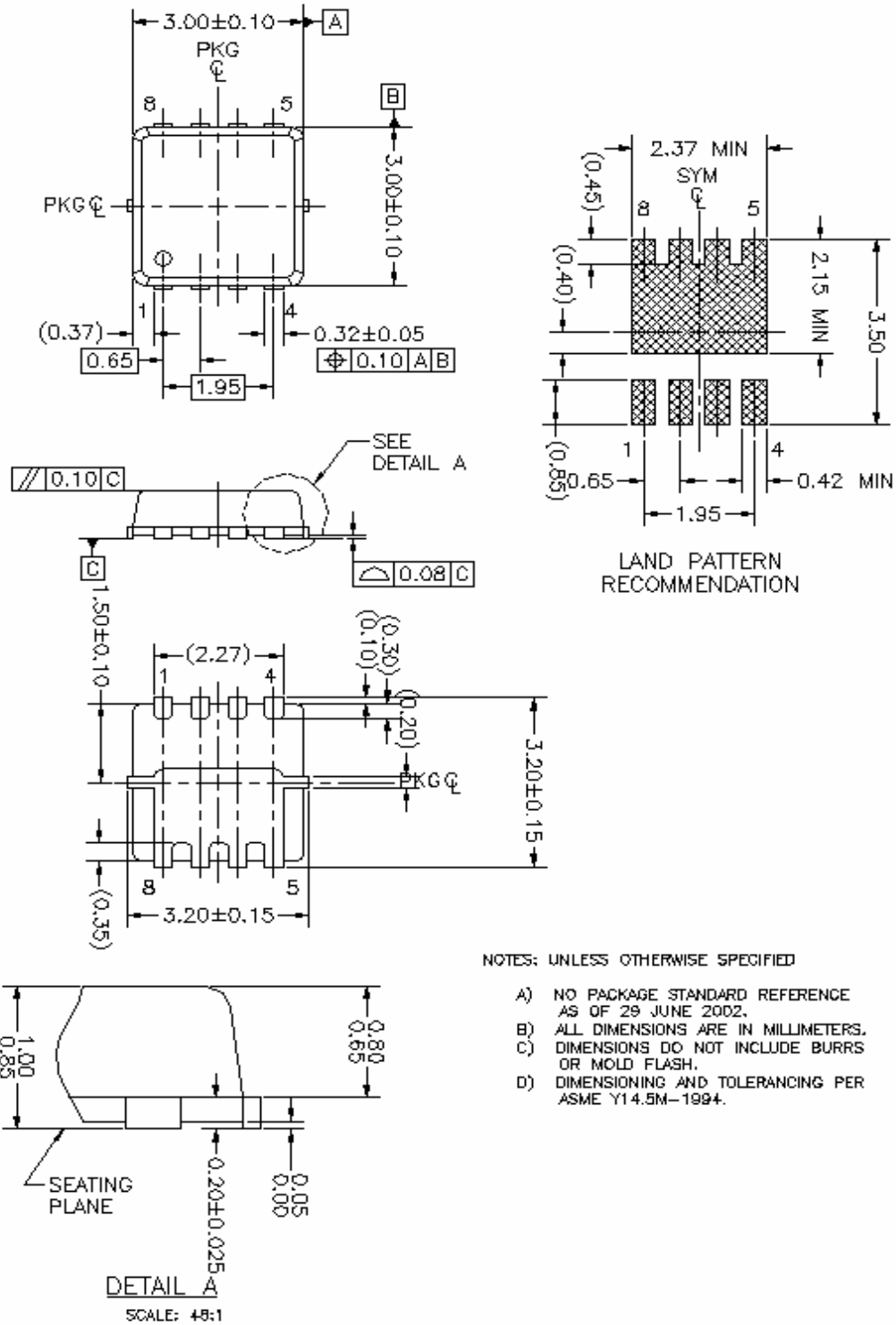


Figure 12. Transient Thermal Response Curve



NOTES: UNLESS OTHERWISE SPECIFIED

- A) NO PACKAGE STANDARD REFERENCE AS OF 29 JUNE 2002.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH.
- D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.

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