



January 2007

FDM3300NZ

Monolithic Common Drain N-Channel 2.5V Specified PowerTrench[®] MOSFET
20V, 10A, 23mΩ

Features

- Max $r_{DS(on)}$ = 23mΩ at $V_{GS} = 4.5V$, $I_D = 10A$
- Max $r_{DS(on)}$ = 28mΩ at $V_{GS} = 2.5V$, $I_D = 9A$
- >2000V ESD protection
- Low Profile - 1mm maximum - in the new package MLP 3.3x3.3 mm
- RoHS Compliant

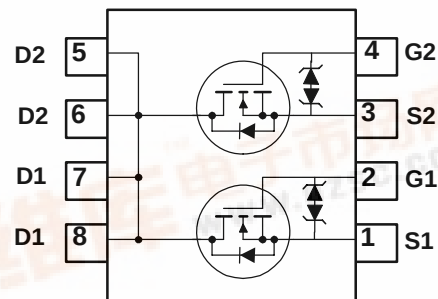
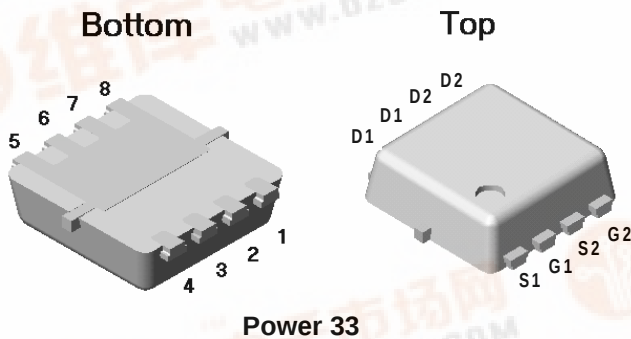


General Description

This dual N-Channel MOSFET has been designed using Fairchild Semiconductor's advanced PowerTrench[®] process to optimize the $r_{DS(on)}$ @ $V_{GS} = 2.5V$ on special MLP lead frame with all the drains on one side of the package.

Application

- Li-Ion Battery Pack



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

Symbol	Parameter	Rating	Units
V_{DS}	Drain to Source Voltage	20	V
V_{GS}	Gate to Source Voltage	± 12	V
I_D	Drain Current -Continuous	10	A
	-Pulsed	40	
P_D	Power Dissipation (Steady State)	2.1	W
		0.9	
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ C$

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1a)	60	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1b)	135	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
3300N	FDM3300NZ	Power 33	7"	8mm	3000 units

FDM3300NZ Monolithic Common Drain N-Channel 2.5V Specified PowerTrench[®] MOSFET

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

BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$	20			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\mu\text{A}$, referenced to 25°C		10.7		mV/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 16\text{V}$, $V_{GS} = 0\text{V}$			1	μA
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 12\text{V}$, $V_{DS} = 0\text{V}$			± 10	μA

On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 250\mu\text{A}$	0.6	0.9	1.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250\mu\text{A}$, referenced to 25°C		-3		mV/ $^\circ\text{C}$
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 4.5\text{V}$, $I_D = 10\text{A}$		16	23	m Ω
		$V_{GS} = 2.5\text{V}$, $I_D = 9\text{A}$		20	28	
		$V_{GS} = 4.5\text{V}$, $I_D = 10\text{A}$, $T_J = 125^\circ\text{C}$		22	31	
g_{FS}	Forward Transconductance	$V_{DS} = 5\text{V}$, $I_D = 10\text{A}$		35		S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 10\text{V}$, $V_{GS} = 0\text{V}$, $f = 1\text{MHz}$		1210	1610	pF
C_{oss}	Output Capacitance			330	440	pF
C_{rss}	Reverse Transfer Capacitance			180	270	pF
R_g	Gate Resistance	$f = 1\text{MHz}$		2.3		Ω

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 10\text{V}$, $I_D = 1.0\text{A}$ $V_{GS} = 4.5\text{V}$, $R_{GEN} = 6.0\Omega$		10	20	ns
t_r	Rise Time			14	25	ns
$t_{d(off)}$	Turn-Off Delay Time			26	42	ns
t_f	Fall Time			13	23	ns
Q_g	Total Gate Charge	$V_{GS} = 4.5\text{V}$		12	17	nC
Q_{gs}	Gate to Source Gate Charge	$V_{DD} = 10\text{V}$		2		nC
Q_{gd}	Gate to Drain "Miller" Charge	$I_D = 10\text{A}$		4		nC

Drain-Source Diode Characteristics

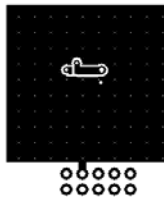
V_{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{V}$, $I_S = 2.0\text{A}$ (Note 2)		0.7	1.2	V
t_{rr}	Reverse Recovery Time	$I_F = 10\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$		20		ns
Q_{rr}	Reverse Recovery Charge			6		nC

Notes:

1: $R_{\theta JA}$ is determined with the device mounted on a 1 in² 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) $R_{\theta JA} = 60^\circ\text{C/W}$ when mounted on a 1 in² pad of 2 oz copper, 1.5"x1.5"x0.062" thick PCB.

(b) $R_{\theta JA} = 135^\circ\text{C/W}$ when mounted on a minimum pad of 2 oz copper.



a. 60°C/W when mounted on a 1 in² pad of 2 oz copper



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

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

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

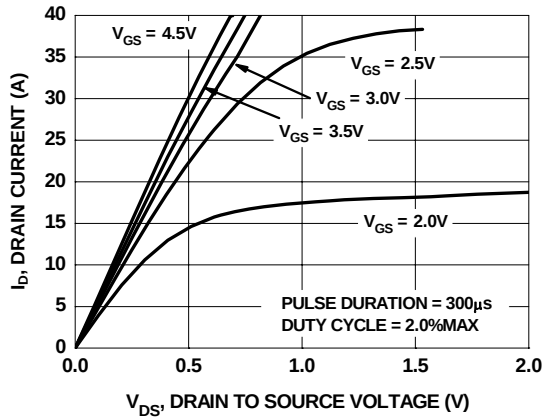


Figure 1. On Region Characteristics

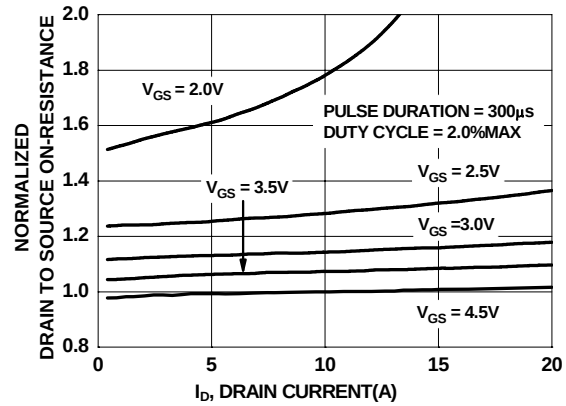


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

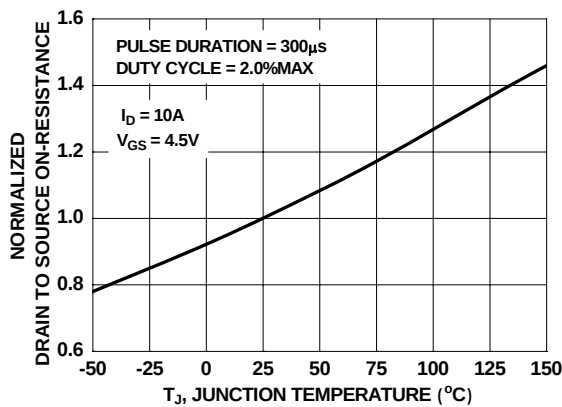


Figure 3. Normalized On Resistance vs Junction Temperature

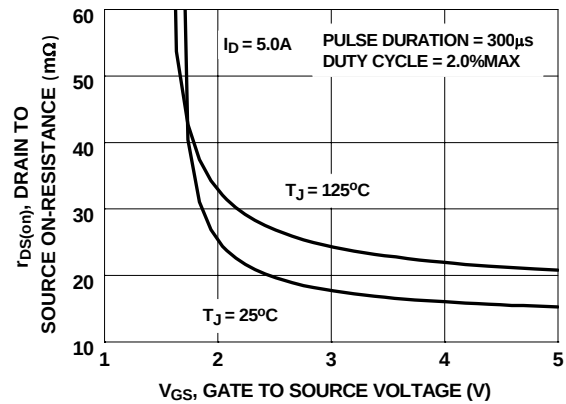


Figure 4. On-Resistance vs Gate to Source Voltage

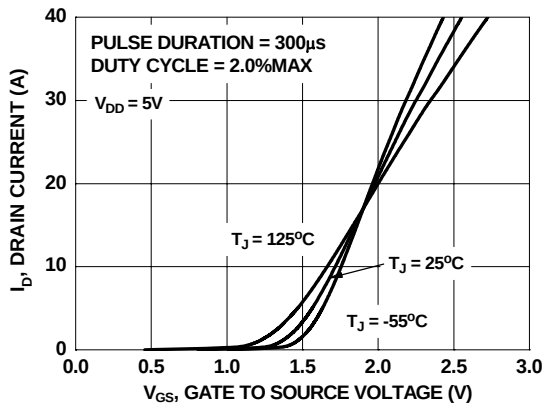


Figure 5. Transfer Characteristics

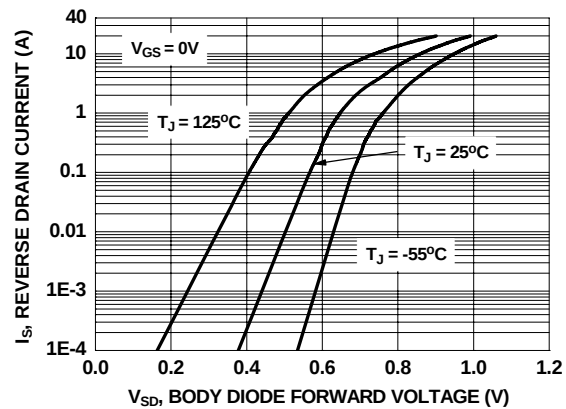


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

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

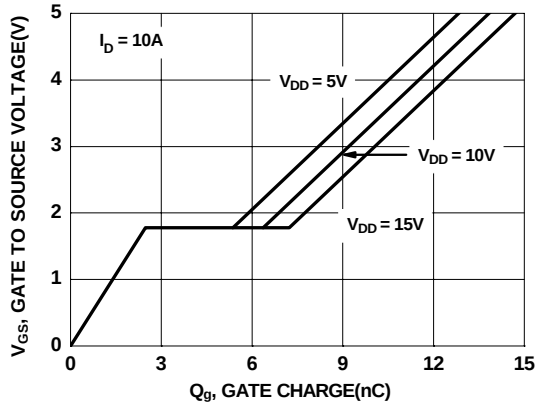


Figure 7. Gate Charge Characteristics

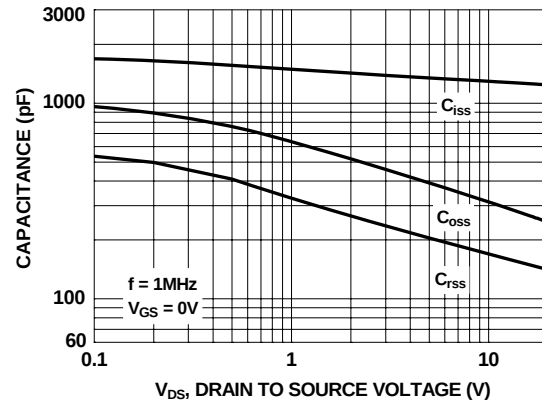


Figure 8. Capacitance vs Drain to Source Voltage

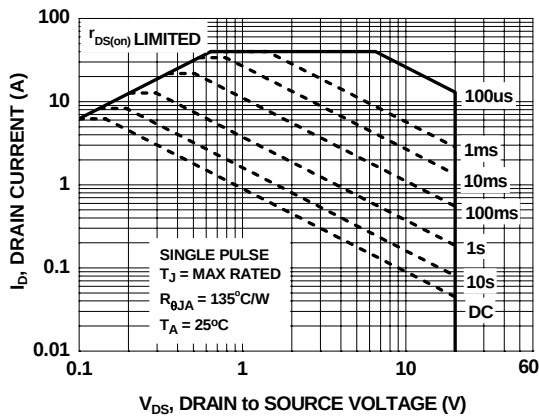


Figure 9. Forward Bias Safe Operating Area

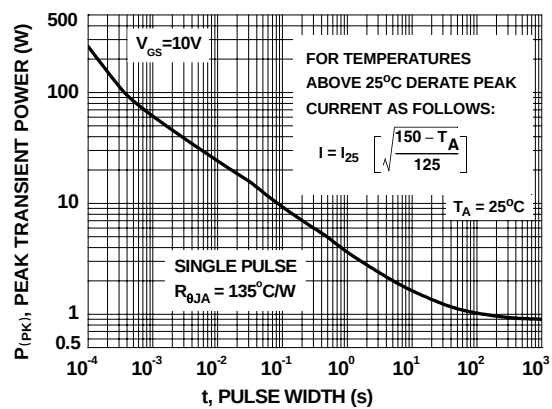


Figure 10. Single Pulse Maximum Power Dissipation

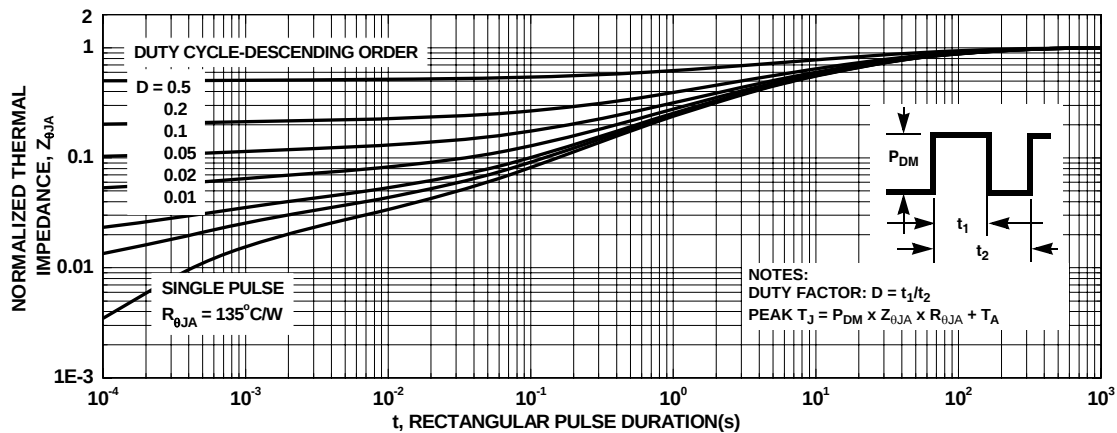
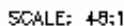


Figure 11. Transient Thermal Response Curve



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