

# 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

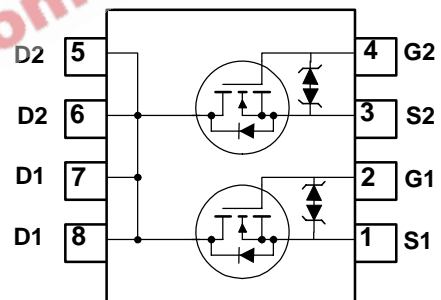
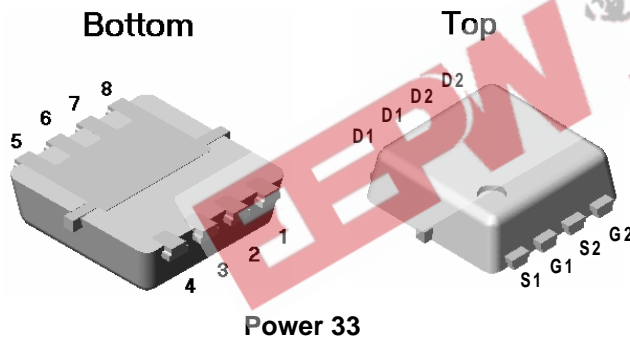


### General Description

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	(Note 1a) 10	A
	-Pulsed	40	
$P_D$	Power Dissipation (Steady State)	(Note 1a) 2.1	W
		(Note 1b) 0.9	
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +150	°C

### Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1a) 60	°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

### 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 $25^\circ\text{C}$		10.7		mV/ $^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 16\text{V}, V_{GS} = 0\text{V}$			1	$\mu\text{A}$
$I_{GSS}$	Gate to Source Leakage Current	$V_{GS} = \pm 12\text{V}, V_{DS} = 0\text{V}$			$\pm 10$	$\mu\text{A}$

#### 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 $25^\circ\text{C}$		-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 $\Omega$
		$V_{GS} = 2.5\text{V}, I_D = 9\text{A}$		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
$C_{riss}$	Reverse Transfer Capacitance			180	270	pF
$R_g$	Gate Resistance		$f = 1\text{MHz}$	2.3		$\Omega$

#### 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		$V_{DD} = 10\text{V}$ $I_D = 10\text{A}$		2		nC
$Q_{gd}$	Gate to Drain "Miller" Charge			4		nC	

#### Drain-Source Diode Characteristics

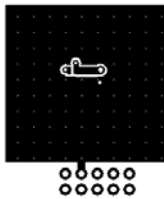
$V_{SD}$	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{V}, I_S = 2.0\text{A}$ (Note 2)		0.7	1.2	V
$t_{rr}$	Reverse Recovery Time	$I_F = 10\text{A}, di/dt = 100\text{A}/\mu\text{s}$		20		ns
$Q_{rr}$	Reverse Recovery Charge			6		nC

#### Notes:

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

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



a.  $60^\circ\text{C}/\text{W}$  when mounted on a 1 in<sup>2</sup> pad of 2 oz copper



b.  $135^\circ\text{C}/\text{W}$  when mounted on a minimum pad of 2 oz copper

2: Pulse Test: Pulse Width < 300 $\mu\text{s}$ , Duty cycle < 2.0%.

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

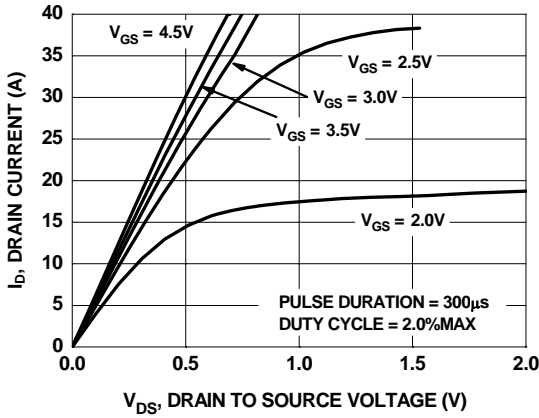


Figure 1. On Region Characteristics

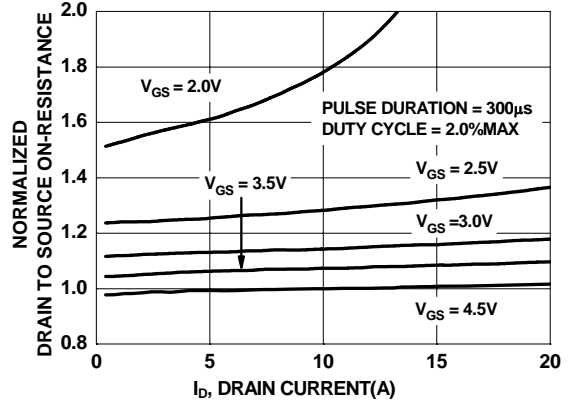


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

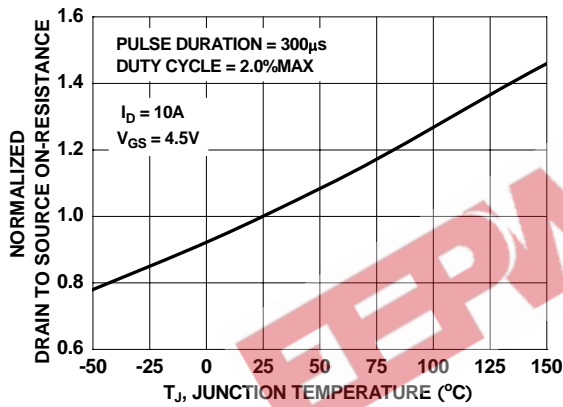


Figure 3. Normalized On Resistance vs Junction Temperature

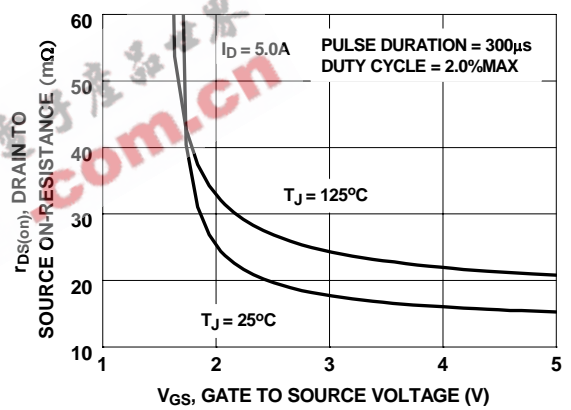


Figure 4. On-Resistance vs Gate to Source Voltage

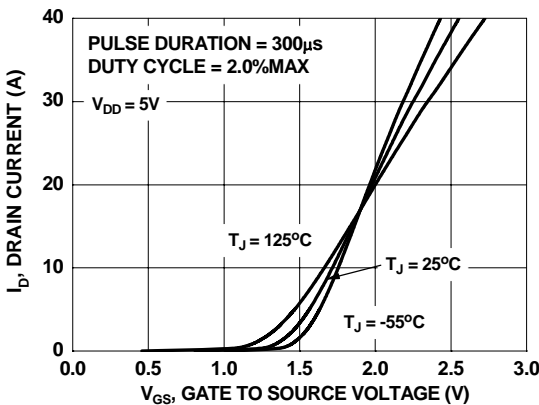


Figure 5. Transfer Characteristics

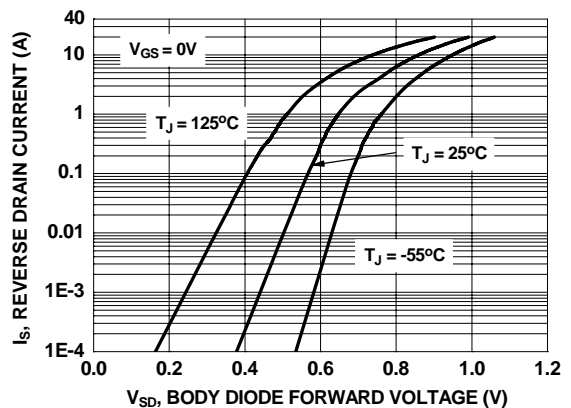
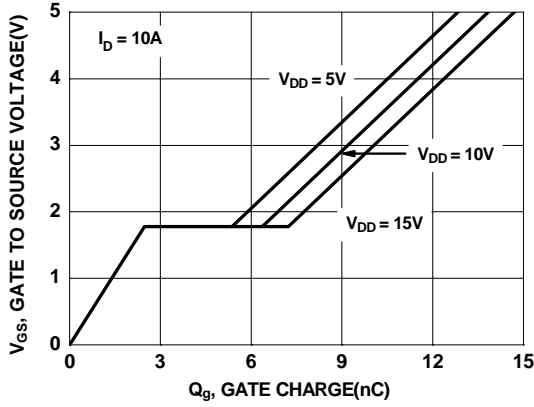
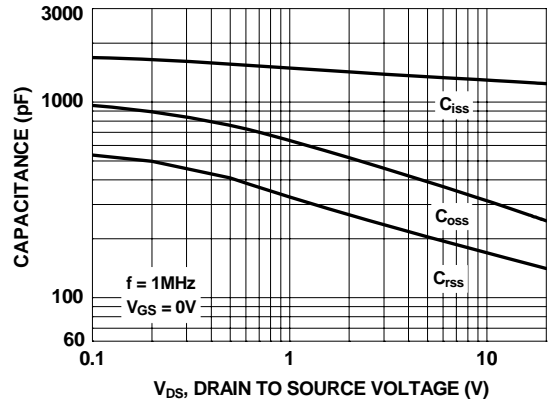


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

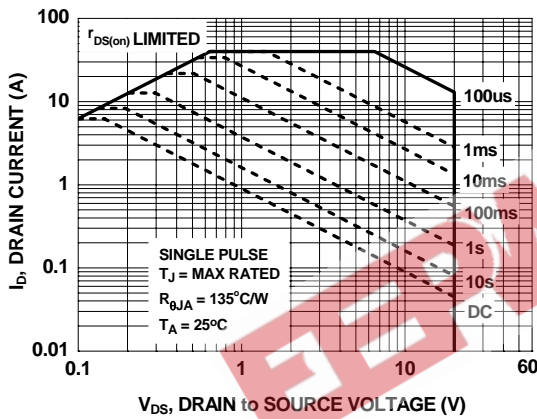
**Typical Characteristics**  $T_J = 25^\circ\text{C}$  unless otherwise noted



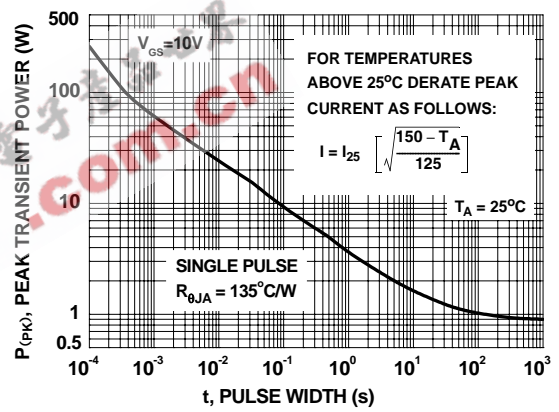
**Figure 7. Gate Charge Characteristics**



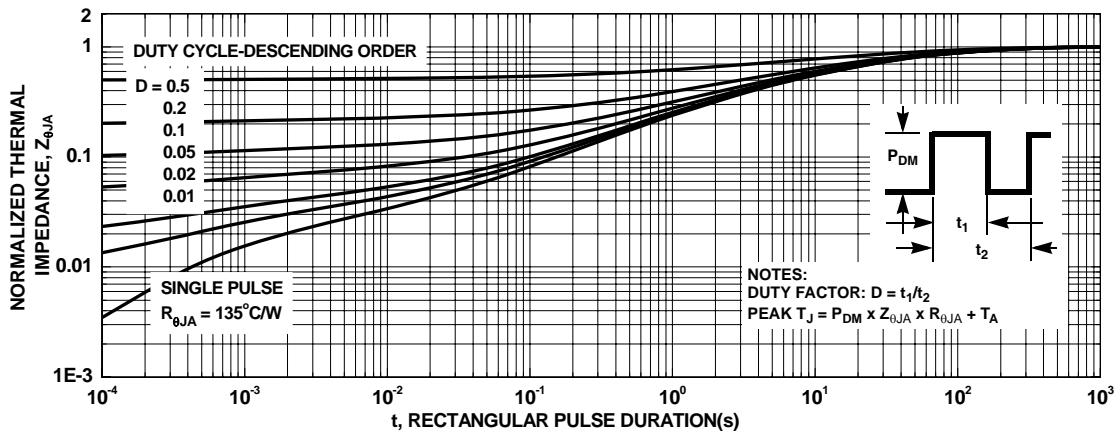
**Figure 8. Capacitance vs Drain to Source Voltage**



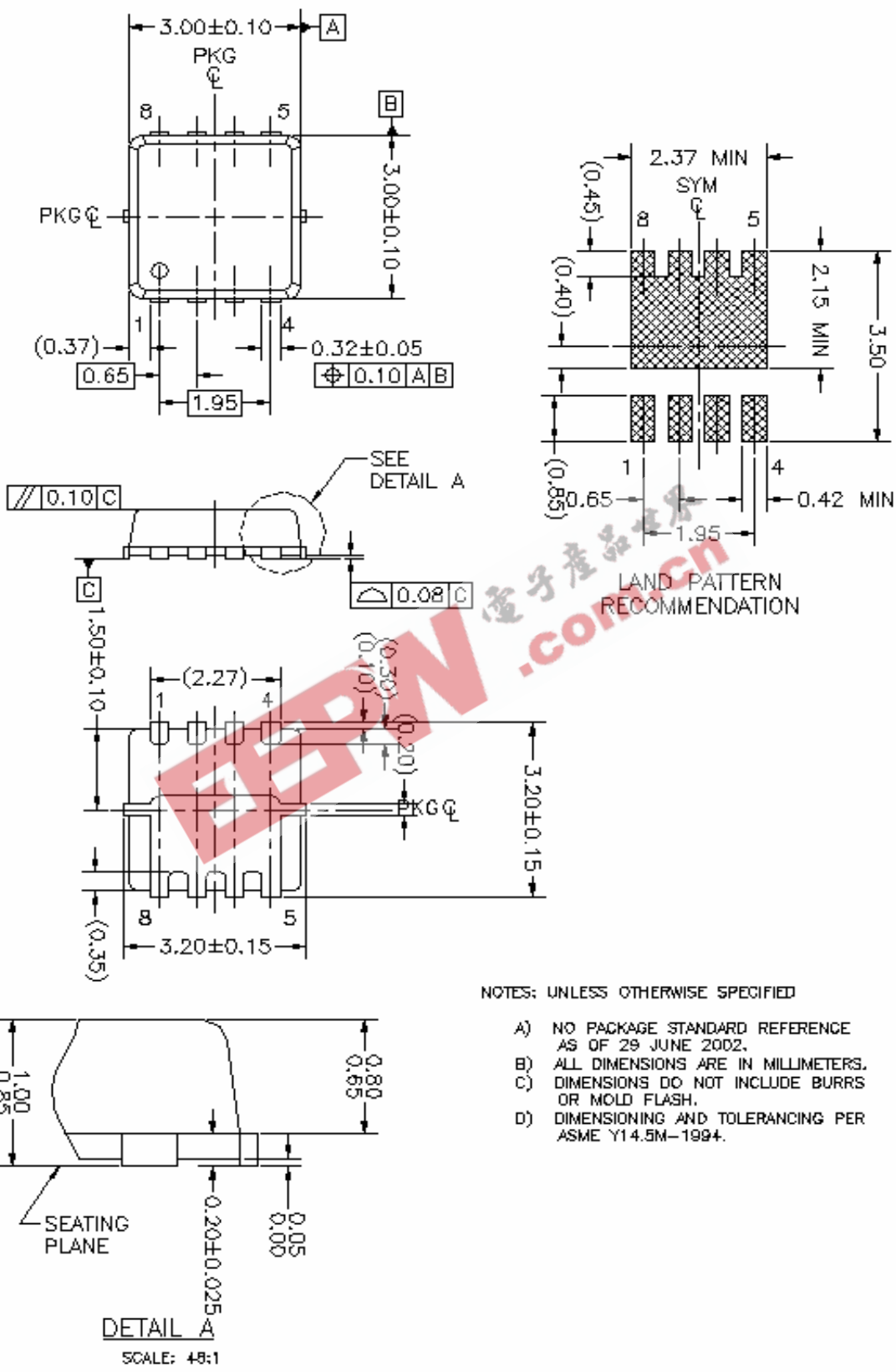
**Figure 9. Forward Bias Safe Operating Area**



**Figure 10. Single Pulse Maximum Power Dissipation**



**Figure 11. Transient Thermal Response Curve**



- 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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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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