FAIRCHILD SEMICONDUCTOR®

May 2006

FDMA2002NZ

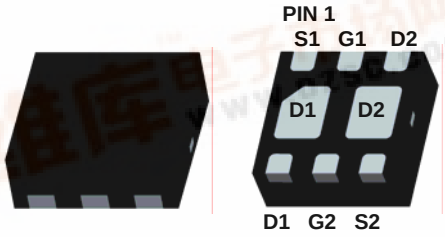
Dual N-Channel PowerTrench® MOSFET

General Description

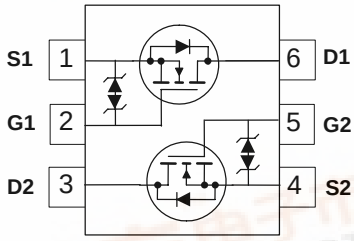
This device is designed specifically as a single package solution for dual switching requirements in cellular handset and other ultra-portable applications. It features two independent N-Channel MOSFETs with low on-state resistance for minimum conduction losses. The MicroFET 2x2 offers exceptional thermal performance for its physical size and is well suited to linear mode applications.

Features

- 2.9 A, 30 V $R_{DS(ON)}$ = 123 mΩ @ V_{GS} = 4.5 V
  $R_{DS(ON)}$ = 140 mΩ @ V_{GS} = 3.0 V
  $R_{DS(ON)}$ = 163 mΩ @ V_{GS} = 2.5 V
- Low profile – 0.8 mm maximum – in the new package MicroFET 2x2 mm
- RoHS Compliant



MicroFET 2x2



Absolute Maximum Ratings T_A=25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V_{DS}	Drain-Source Voltage		30	V
V_{GS}	Gate-Source Voltage		±12	V
I_D	Drain Current – Continuous (T_C = 25°C, V_{GS} = 4.5V)		2.9	A
	– Continuous (T_C = 25°C, V_{GS} = 2.5V)		2.7	
	– Pulsed		10	
P_D	Power Dissipation for Single Operation	(Note 1a)	1.5	W
	Power Dissipation for Single Operation	(Note 1b)	0.65	
T_J, T_{STG}	Operating and Storage Temperature		–55 to +150	°C

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1a)	83 (Single Operation)	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1b)	193 (Single Operation)	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1c)	68 (Dual Operation)	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1d)	145 (Dual Operation)	

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
002	FDMA2002NZ	7''	8mm	3000 units

Electrical Characteristics

T_A = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain–Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA	30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C		25		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 24 V, V_{GS} = 0 V			1	μA
I_{GSS}	Gate–Body Leakage Current	V_{GS} = ± 12 V, V_{DS} = 0 V			±10	μA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 μA	0.4	1.0	1.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C		–3		mV/°C
$R_{DS(on)}$	Static Drain–Source On–Resistance	V_{GS} = 4.5V, I_D = 2.9A		75	123	mΩ
		V_{GS} = 3.0V, I_D = 2.7A		84	140	
		V_{GS} = 2.5V, I_D = 2.5A		92	163	
		V_{GS} = 4.5V, I_D = 2.9A, T_C = 85°C		95	166	
		V_{GS} = 3.0V, I_D = 2.7A, T_C = 150°C		138	203	
		V_{GS} = 2.5V, I_D = 2.5A, T_C = 150°C		150	268	
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 15 V, V_{GS} = 0 V, f = 1.0 MHz		190	220	pF
C_{oss}	Output Capacitance			30	40	pF
C_{rss}	Reverse Transfer Capacitance			20	30	pF
Switching Characteristics (Note 2)						
$t_{d(on)}$	Turn–On Delay Time	V_{DD} = 15 V, I_D = 1 A, V_{GS} = 4.5 V, R_{GEN} = 6 Ω		6	12	ns
t_r	Turn–On Rise Time			8	16	ns
$t_{d(off)}$	Turn–Off Delay Time			12	21	ns
t_f	Turn–Off Fall Time			2	10	ns
Q_g	Total Gate Charge	V_{DS} = 15 V, I_D = 2.9 A, V_{GS} = 4.5 V		2.4	3.0	nC
Q_{gs}	Gate–Source Charge			0.35		nC
Q_{gd}	Gate–Drain Charge			0.75		nC
Drain–Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain–Source Diode Forward Current				2.9	A
V_{SD}	Drain–Source Diode Forward Voltage	I_S = 2.0 A		0.9	1.2	V
		I_S = 1.1 A		0.8	1.2	
t_{rr}	Diode Reverse Recovery Time	I_F = 2.9 A, dI_F/dt = 100 A/μs		10		ns
Q_{rr}	Diode Reverse Recovery Charge			2		nC

Electrical Characteristics

T_A = 25°C unless otherwise noted

Notes:

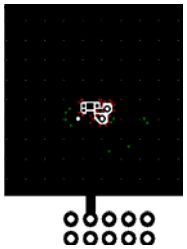
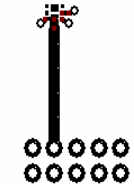
1. $R_{\theta JA}$ is determined with the device mounted on a 1 in^2 oz. copper pad on a 1.5 x 1.5 in. board of FR-4 material. $R_{\theta JC}$ is guaranteed by design while $R_{\theta JA}$ is determined by the user's board design.

(a) $R_{\theta JA}$ = 83°C/W when mounted on a 1in^2 pad of 2 oz copper, 1.5" x 1.5" x 0.062" thick PCB

(b) $R_{\theta JA}$ = 193°C/W when mounted on a minimum pad of 2 oz copper

(c) $R_{\theta JA}$ = 68°C/W when mounted on a 1in^2 pad of 2 oz copper, 1.5" x 1.5" x 0.062" thick PCB

(d) $R_{\theta JA}$ = 145°C/W when mounted on a minimum pad of 2 oz copper

	a) 83°C/W when mounted on a 1in^2 pad of 2 oz copper		b) 193°C/W when mounted on a minimum pad of 2 oz copper

Scale 1 : 1 on letter size paper

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

Typical Characteristics

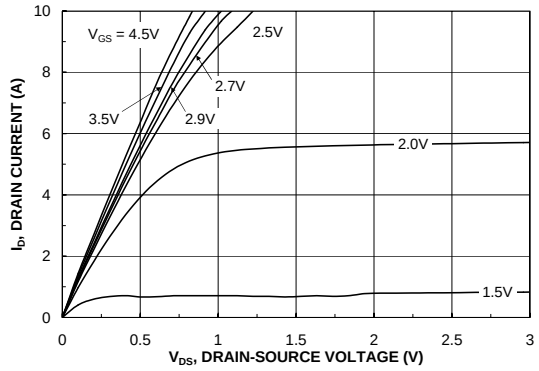


Figure 1. On-Region Characteristics.

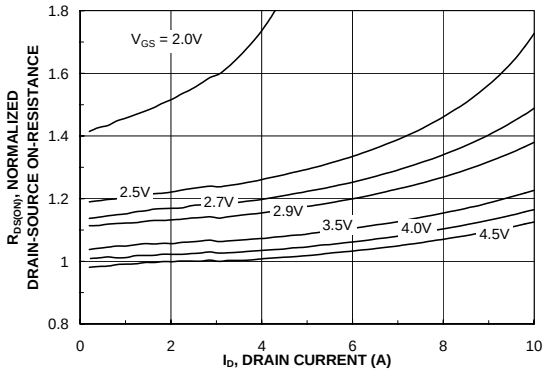


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

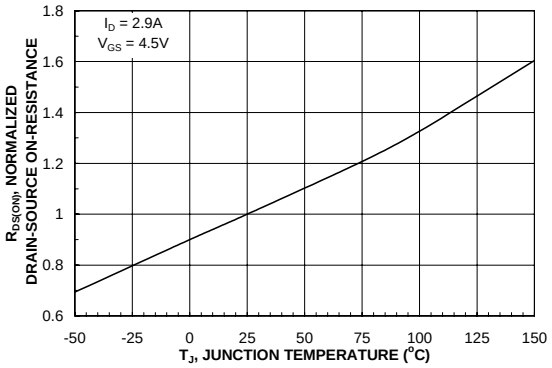


Figure 3. On-Resistance Variation with Temperature.

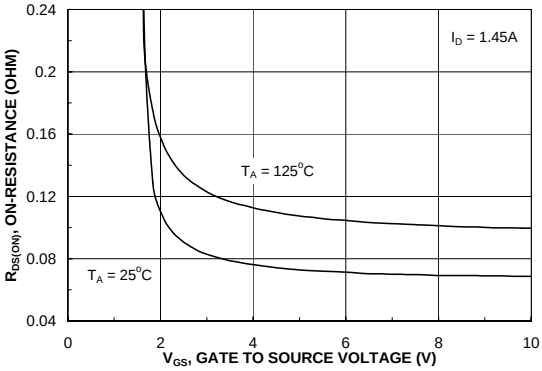


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

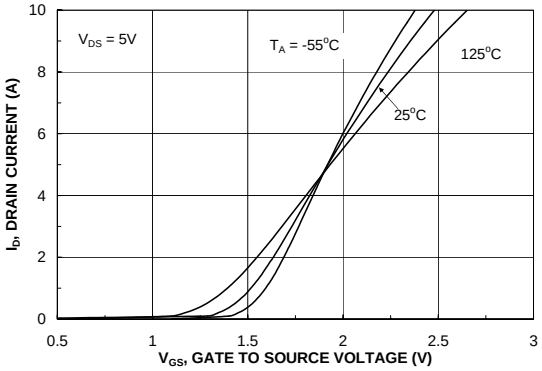


Figure 5. Transfer Characteristics.

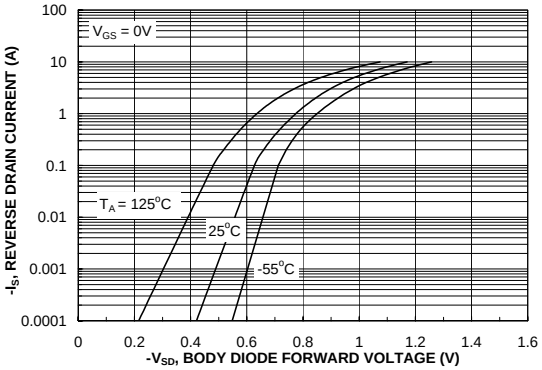


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics

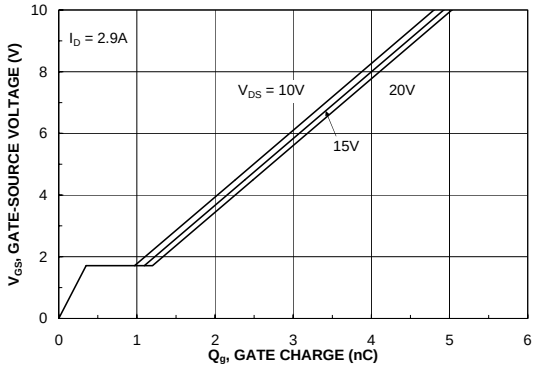


Figure 7. Gate Charge Characteristics.

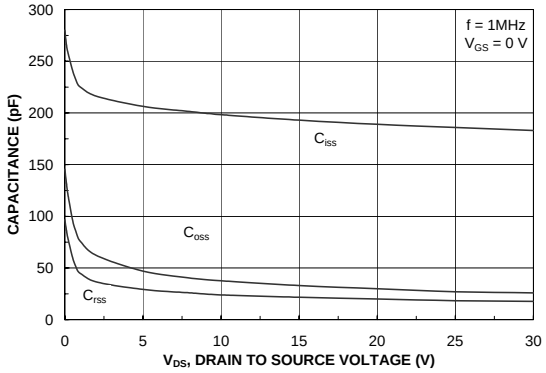


Figure 8. Capacitance Characteristics.

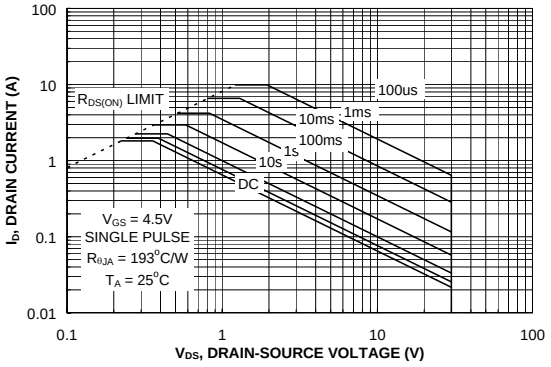


Figure 9. Maximum Safe Operating Area.

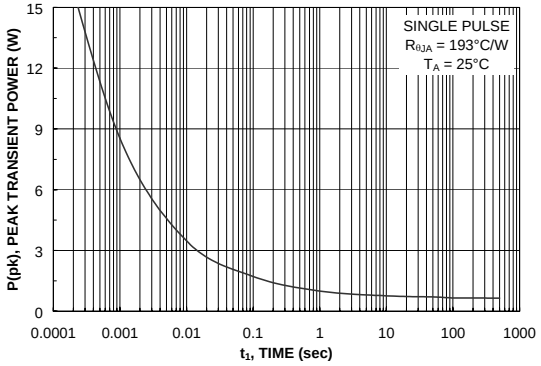


Figure 10. Single Pulse Maximum Power Dissipation.

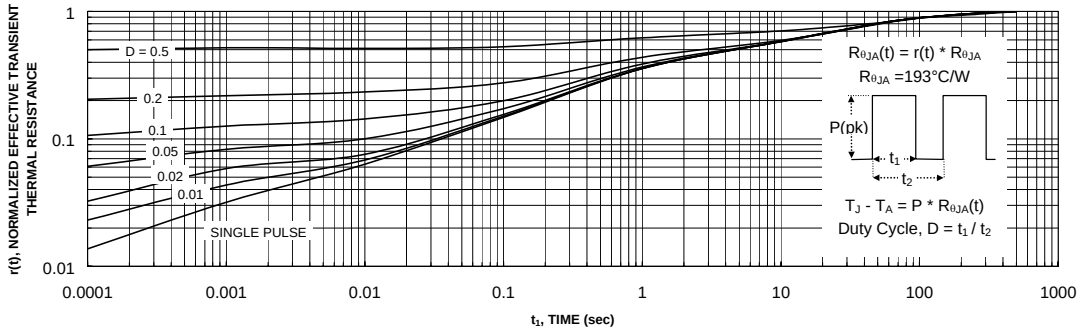
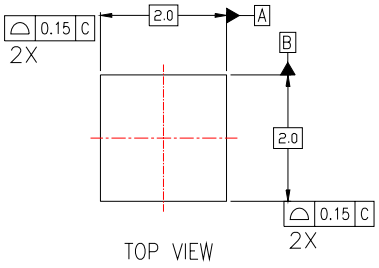
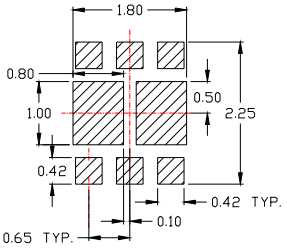


Figure 11. Transient Thermal Response Curve.

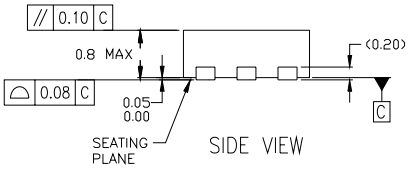
Thermal characterization performed using the conditions described in Note 1b.
Transient thermal response will change depending on the circuit board design.



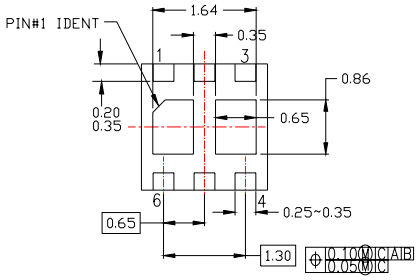
TOP VIEW



RECOMMENDED LAND PATTERN



SIDE VIEW



BOTTOM VIEW

NOTES:

A. CONFORMS TO JEDEC REGISTRATION MO-229, VARIATION VCCC, DATED 11/2001

B. DIMENSIONS ARE IN MILLIMETERS.

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

MLP06JrevB

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