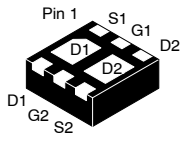
MOSFET – Dual, N-Channel, POWERTRENCH®

30 V, 2.9 A, 123 mΩ

FDMA2002NZ

V_{DS}	$R_{DS(on)}$ MAX	I_D MAX
30 V	123 mΩ @ 4.5 V	2.9 A
	140 mΩ @ 3.0 V	
	163 mΩ @ 2.5 V	



WDFN6 2x2, 0.65P
(MicroFET 2x2)
CASE 511DA

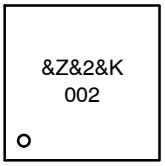
General Description

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

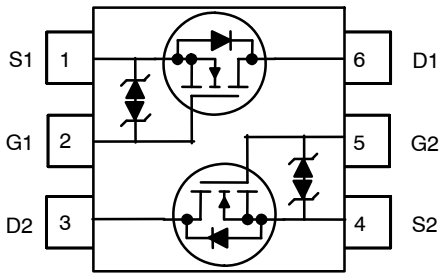
- 2.9 A, 30 V
  $R_{DS(on)}$ = 123 mΩ at V_{GS} = 4.5 V
  $R_{DS(on)}$ = 140 mΩ at V_{GS} = 3.0 V
  $R_{DS(on)}$ = 163 mΩ at V_{GS} = 2.5 V
- Low Profile − 0.8 mm Maximum − In the New Package MicroFET 2x2 mm
- HBM ESD Protection Level > 1.8 kV (Note 3)
- Free from Halogenated Compounds and Antimony Oxides
- This Device is Pb−Free, Halide Free and is RoHS Compliant

MARKING DIAGRAM



&Z = Assembly Plant Code
&2 = 2−Digit Date Code
&K = 2−Digits Lot Run Traceability Code
002 = Device Code

PIN CONNECTIONS



ORDERING INFORMATION

Device	Package	Shipping†
FDMA2002NZ	WDFN6 (Pb−Free, Halide Free)	3000 / Tape & Reel

For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Ratings	Unit
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} = 4.5 V) −Continuous (T_C = 25°C, V_{GS} = 2.5 V)	 2.9 2.7	A
	−Pulsed	10	A
P_D	Power Dissipation for Single Operation (Note 1a) (Note 1b)	 1.5 0.65	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	−55 to +150	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL CHARACTERISTICS

Symbol	Parameter	Ratings	Unit
$R_{\theta JA}$	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)	

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

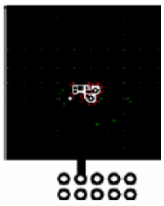
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
BV_{DSS}	Drain−Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0 V	30	–	–	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25°C	–	25	–	mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 24 V, V_{GS} = 0 V	–	–	1	μA
I_{GSS}	Gate−Body Leakage	V_{GS} = ±12 V, V_{DS} = 0 V	–	–	±10	μA
ON CHARACTERISTICS						
$V_{GS(th)}$	Gate Threshold Voltage	I_D = 250 μA, V_{DS} = V_{GS}	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} = 4.5 V, I_D = 2.9 A	–	75	123	mΩ
		V_{GS} = 3.0 V, I_D = 2.7 A	–	84	140	
		V_{GS} = 2.5 V, I_D = 2.5 A	–	92	163	
		V_{GS} = 4.5 V, I_D = 2.9 A, T_C = 85°C	–	95	166	
		V_{GS} = 3.0 V, I_D = 2.7 A, T_C = 150°C	–	138	203	
		V_{GS} = 2.5 V, I_D = 2.5 A, 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

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted) (continued)

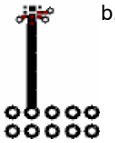
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
SWITCHING CHARACTERISTICS (Note 2)						
$t_{d(on)}$	Turn−On Delay Time	V_{DD} = 15 V, I_D = 1 A, V_{GS} = 4.5 V, R_{GEN} = 6 Ω	–	6	12	ns
t_r	Turn−On Rise Time		–	8	16	ns
$t_{d(off)}$	Turn−Off Delay Time		–	12	21	ns
t_f	Turn−Off Fall Time		–	2	10	ns
Q_g	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 Source−Drain Diode Forward Current		–	–	2.9	A
V_{SD}	Source−Drain 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

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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 1 in^2 pad of 2 oz copper, 1.5" x 1.5" x 0.062" thick PCB. For single operation.
   b. $R_{\theta JA}$ = 193°C/W when mounted on a minimum pad of 2 oz copper.. For single operation.
   c. $R_{\theta JA}$ = 68°C/W when mounted on a 1 in^2 pad of 2 oz copper, 1.5" x 1.5" x 0.062" thick PCB. For dual operation.
   d. $R_{\theta JA}$ = 145°C/W when mounted on a minimum pad of 2 oz copper. For dual operation.

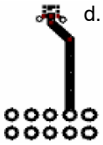


a. 83°C/W when mounted on a 1 in^2 pad of 2 oz copper.



b. 193°C/W when mounted on a minimum pad of 2 oz copper.

c. 68°C/W when mounted on a 1 in^2 pad of 2 oz copper.



d. 145°C/W when mounted on a minimum pad of 2 oz copper.

2. Pulse Test: Pulse Width < 300 μs, Duty Cycle < 2.0%
3. The diode connected between the gate and source serves only as protection against ESD. No gate overvoltage rating is implied.

TYPICAL CHARACTERISTICS

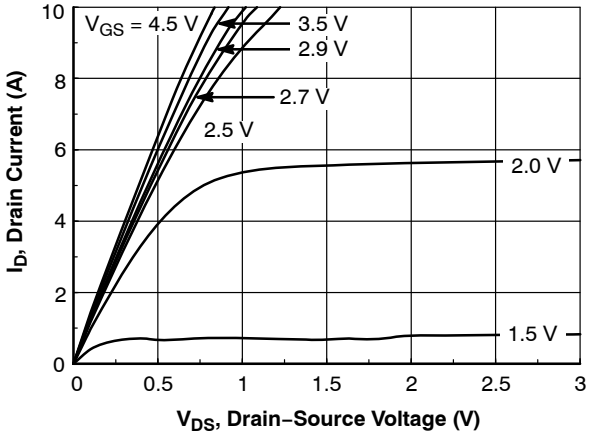


Figure 1. On−Region Characteristics

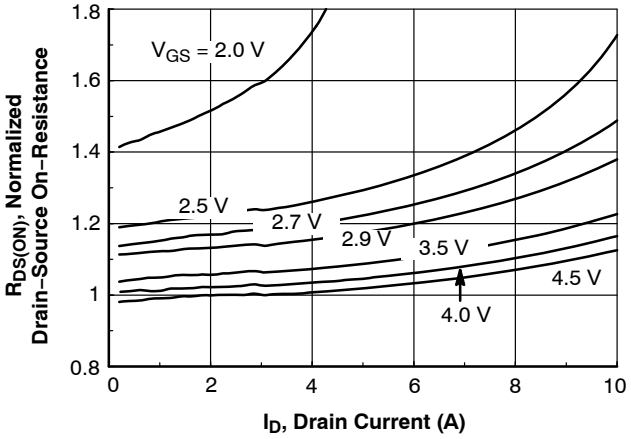


Figure 2. On−Resistance Variation with Drain Current and Gate Voltage

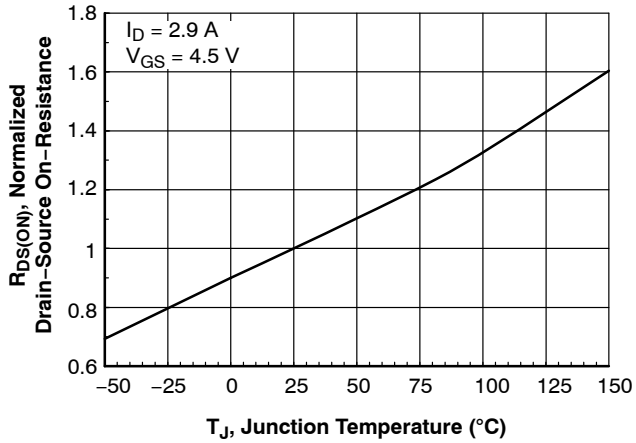


Figure 3. On−Resistance Variation with Temperature

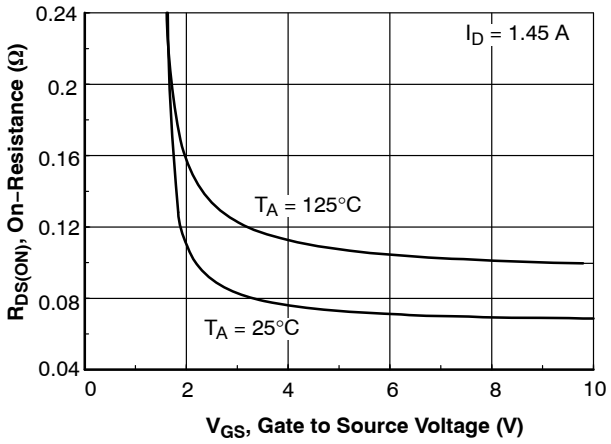


Figure 4. On−Resistance Variation with Gate−to−Source Voltage

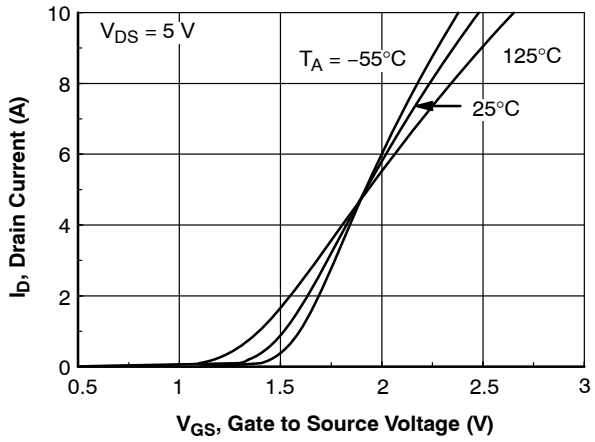


Figure 5. Transfer Characteristics

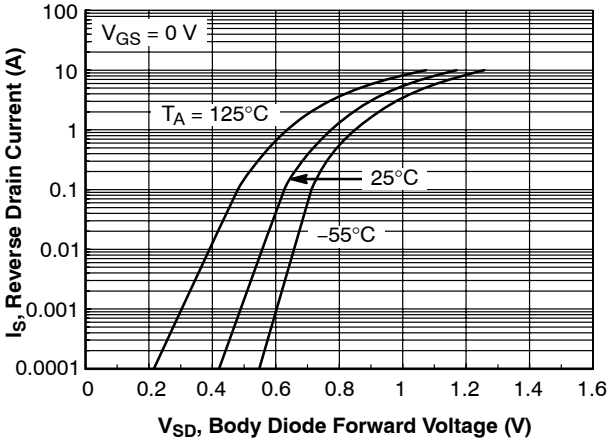


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature

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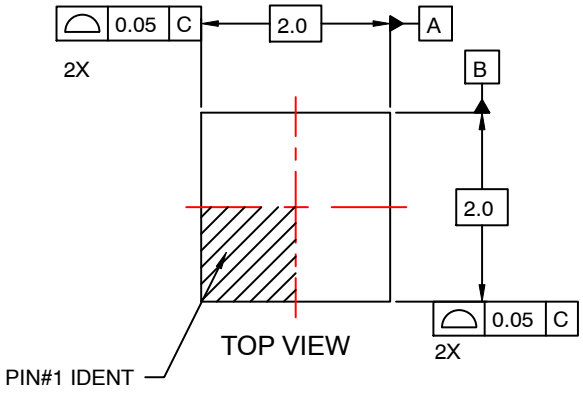
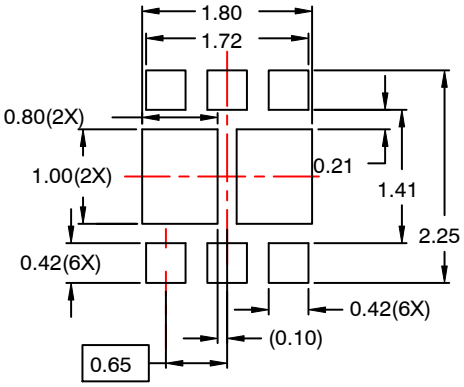
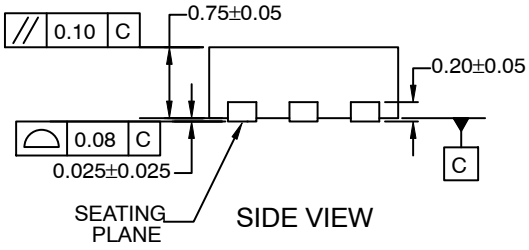
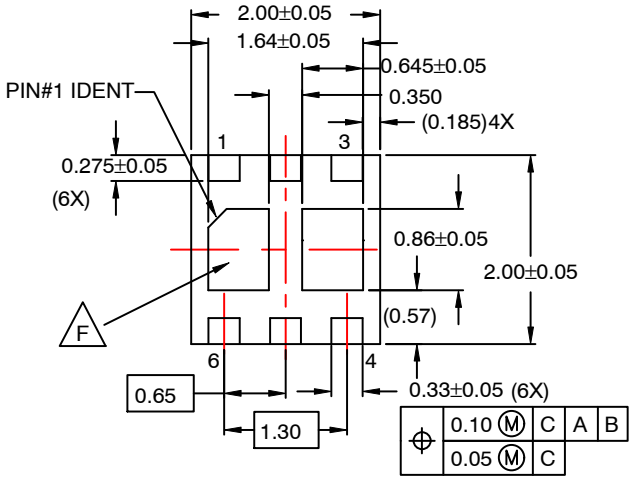




RECOMMENDED
LAND PATTERN





NOTES:

A. CONFORM TO JADEC REGISTRATIONS MO−229, VARIATION VCCC, EXCEPT WHERE NOTED.

B. DIMENSIONS ARE IN MILLIMETERS.

C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 2009.

D. LAND PATTERN RECOMMENDATION IS EXISTING INDUSTRY LAND PATTERN.

F. NON−JEDEC DUAL DAP

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