



ON Semiconductor®

# FDMA1023PZ

## Dual P-Channel PowerTrench® MOSFET

–20V, –3.7A, 72mΩ

### Features

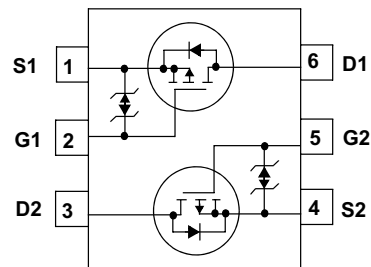
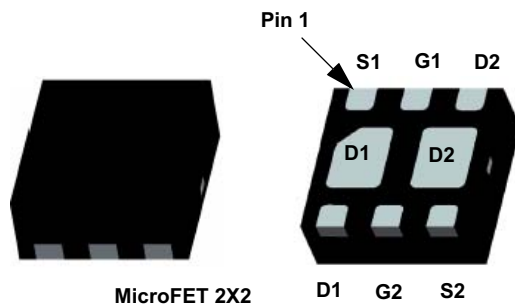
- Max  $r_{DS(on)}$  = 72mΩ at  $V_{GS} = -4.5V$ ,  $I_D = -3.7A$
- Max  $r_{DS(on)}$  = 95mΩ at  $V_{GS} = -2.5V$ ,  $I_D = -3.2A$
- Max  $r_{DS(on)}$  = 130mΩ at  $V_{GS} = -1.8V$ ,  $I_D = -2.0A$
- Max  $r_{DS(on)}$  = 195mΩ at  $V_{GS} = -1.5V$ ,  $I_D = -1.0A$
- Low profile - 0.8 mm maximum - in the new package MicroFET 2x2 mm
- HBM ESD protection level > 2kV typical (Note 3)
- RoHS Compliant
- Free from halogenated compounds and antimony oxides



### General Description

This device is designed specifically as a single package solution for the battery charge switch in cellular handset and other ultra-portable applications. It features two independent P-Channel MOSFETs with low on-state resistance for minimum conduction losses. When connected in the typical common source configuration, bi-directional current flow is possible.

The MicroFET 2X2 package offers exceptional thermal performance for its physical size and is well suited to linear mode applications.



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

Symbol	Parameter	Ratings	Units
$V_{DS}$	Drain to Source Voltage	–20	V
$V_{GS}$	Gate to Source Voltage	±8	V
$I_D$	Drain Current -Continuous	(Note 1a) –3.7	A
	-Pulsed	–6	
$P_D$	Power Dissipation	(Note 1a) 1.5	W
		(Note 1b) 0.7	
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	–55 to +150	°C

### Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance for Single Operation, Junction to Ambient	(Note 1a) 86	°C/W
$R_{\theta JA}$	Thermal Resistance for Single Operation, Junction to Ambient	(Note 1b) 173	
$R_{\theta JA}$	Thermal Resistance for Dual Operation, Junction to Ambient	(Note 1c) 69	
$R_{\theta JA}$	Thermal Resistance for Dual Operation, Junction to Ambient	(Note 1d) 151	

### Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
023	FDMA1023PZ	MicroFET 2X2	7"	8mm	3000 units

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
--------	-----------	-----------------	-----	-----	-----	-------

**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 $25^\circ\text{C}$		-11		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	$V_{GS} = \pm 8\text{V}$ , $V_{DS} = 0\text{V}$			$\pm 10$	$\mu\text{A}$

**On Characteristics**

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$ , $I_D = -250\mu\text{A}$	-0.4	-0.7	-1.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = -250\mu\text{A}$ , referenced to $25^\circ\text{C}$		2.5		mV/ $^\circ\text{C}$
$r_{DS(on)}$	Static Drain to Source On-Resistance	$V_{GS} = -4.5\text{V}$ , $I_D = -3.7\text{A}$		60	72	m $\Omega$
		$V_{GS} = -2.5\text{V}$ , $I_D = -3.2\text{A}$		75	95	
		$V_{GS} = -1.8\text{V}$ , $I_D = -2.0\text{A}$		100	130	
		$V_{GS} = -1.5\text{V}$ , $I_D = -1.0\text{A}$		130	195	
		$V_{GS} = -4.5\text{V}$ , $I_D = -3.7\text{A}$ , $T_J = 125^\circ\text{C}$		81	91	
$g_{FS}$	Forward Transconductance	$V_{DS} = -5\text{V}$ , $I_D = -3.7\text{A}$		12		S

**Dynamic Characteristics**

$C_{iss}$	Input Capacitance	$V_{DS} = -10\text{V}$ , $V_{GS} = 0\text{V}$ , $f = 1\text{MHz}$		490	655	pF
$C_{oss}$	Output Capacitance			100	135	pF
$C_{rss}$	Reverse Transfer Capacitance			90	135	pF

**Switching Characteristics**

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = -10\text{V}$ , $I_D = -1\text{A}$ $V_{GS} = -4.5\text{V}$ , $R_{GEN} = 6\Omega$		9	18	ns
$t_r$	Rise Time			12	22	ns
$t_{d(off)}$	Turn-Off Delay Time			64	103	ns
$t_f$	Fall Time			37	60	ns
$Q_{g(TOT)}$	Total Gate Charge	$V_{DD} = -10\text{V}$ , $I_D = -3.7\text{A}$		8.6	12	nC
$Q_{gs}$	Gate to Source Gate Charge	$V_{GS} = -4.5\text{V}$		0.7		nC
$Q_{gd}$	Gate to Drain "Miller" Charge			2.0		nC

**Drain-Source Diode Characteristics**

$I_S$	Maximum Continuous Source-Drain Diode Forward Current			-1.1		A
$V_{SD}$	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{V}$ , $I_S = -1.1\text{A}$ (Note 2)		-0.8	-1.2	V
$t_{rr}$	Reverse Recovery Time	$I_F = -3.7\text{A}$ , $di/dt = 100\text{A}/\mu\text{s}$		32	48	ns
$Q_{rr}$	Reverse Recovery Charge			15	23	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)  $R_{\theta JA} = 86^{\circ}\text{C/W}$  when mounted on a 1 in<sup>2</sup> pad of 2 oz copper, 1.5" x 1.5" x 0.062" thick PCB. For single operation.

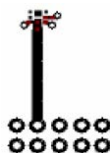
(b)  $R_{\theta JA} = 173^{\circ}\text{C/W}$  when mounted on a minimum pad of 2 oz copper. For single operation.

(c)  $R_{\theta JA} = 69^{\circ}\text{C/W}$  when mounted on a 1 in<sup>2</sup> pad of 2 oz copper, 1.5" x 1.5" x 0.062" thick PCB, For dual operation.

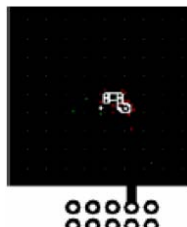
(d)  $R_{\theta JA} = 151^{\circ}\text{C/W}$  when mounted on a minimum pad of 2 oz copper. For dual operation.



a)  $86^{\circ}\text{C/W}$  when mounted on a 1 in<sup>2</sup> pad of 2 oz copper.



b)  $173^{\circ}\text{C/W}$  when mounted on a minimum pad of 2 oz copper.



c)  $69^{\circ}\text{C/W}$  when mounted on a 1 in<sup>2</sup> pad of 2 oz copper.



d)  $151^{\circ}\text{C/W}$  when mounted on a minimum pad of 2 oz copper.

2: Pulse Test : Pulse Width < 300us, 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 $T_J = 25^\circ\text{C}$ unless otherwise noted

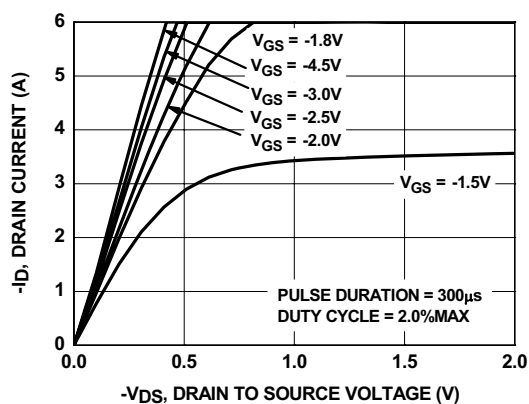


Figure 1. On Region Characteristics

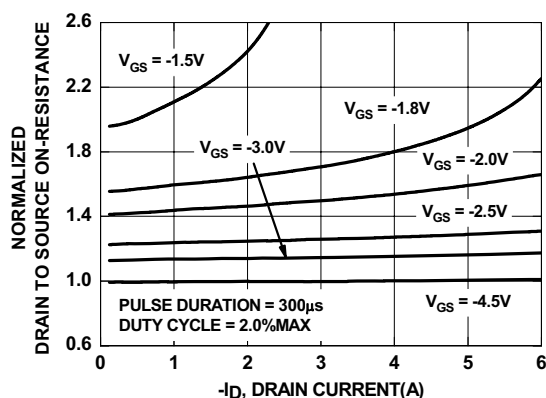


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

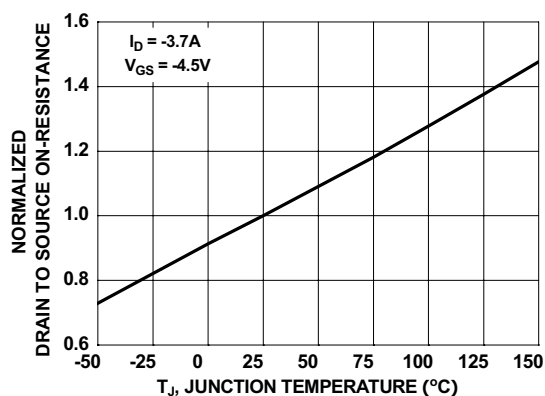


Figure 3. Normalized On-Resistance vs Junction Temperature

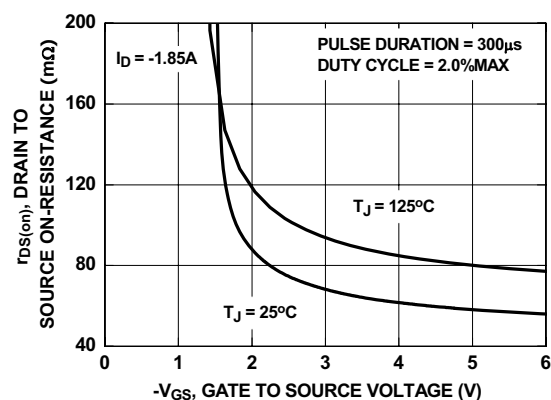


Figure 4. On-Resistance vs Gate to Source Voltage

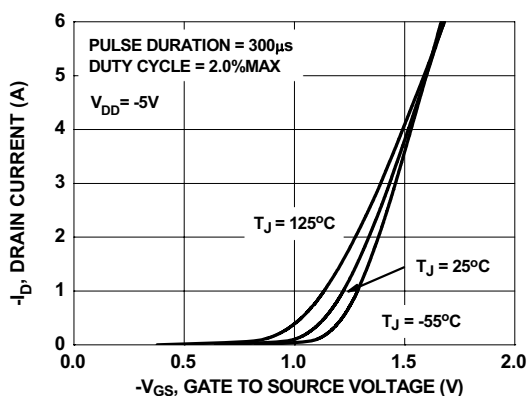


Figure 5. Transfer Characteristics

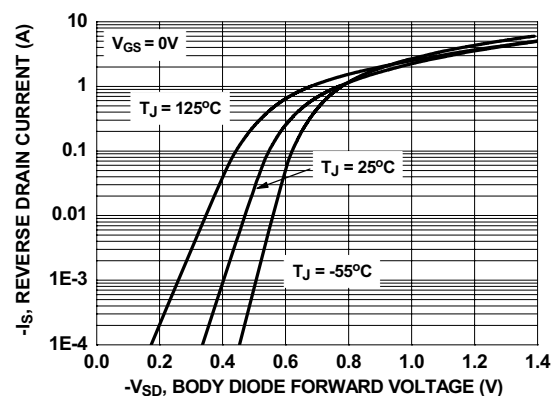


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

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

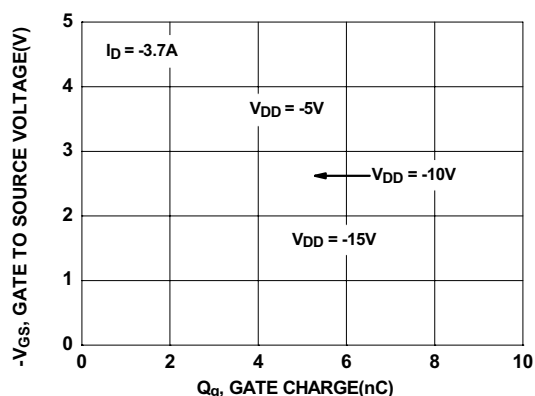


Figure 7. Gate Charge Characteristics

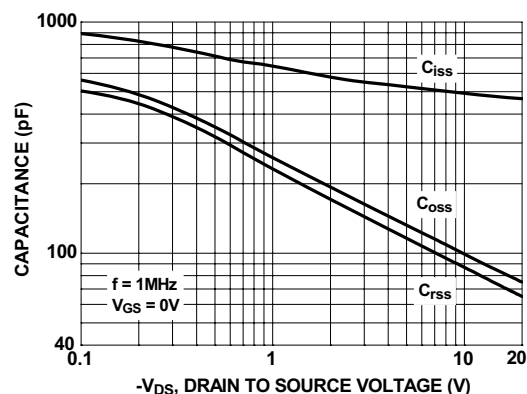


Figure 8. Capacitance Characteristics

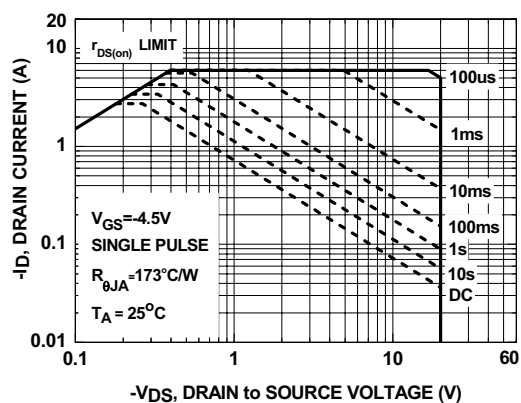


Figure 9. Forward Bias Safe Operating Area

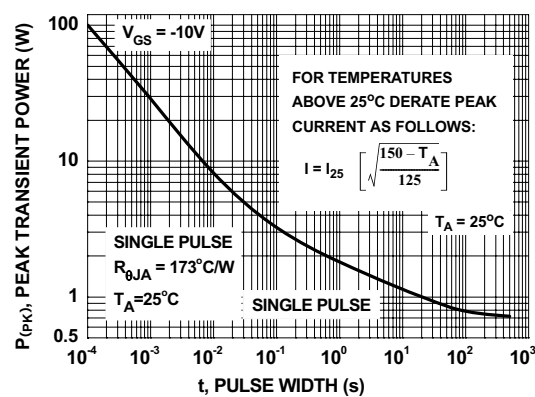


Figure 10. Single Pulse Maximum Power Dissipation

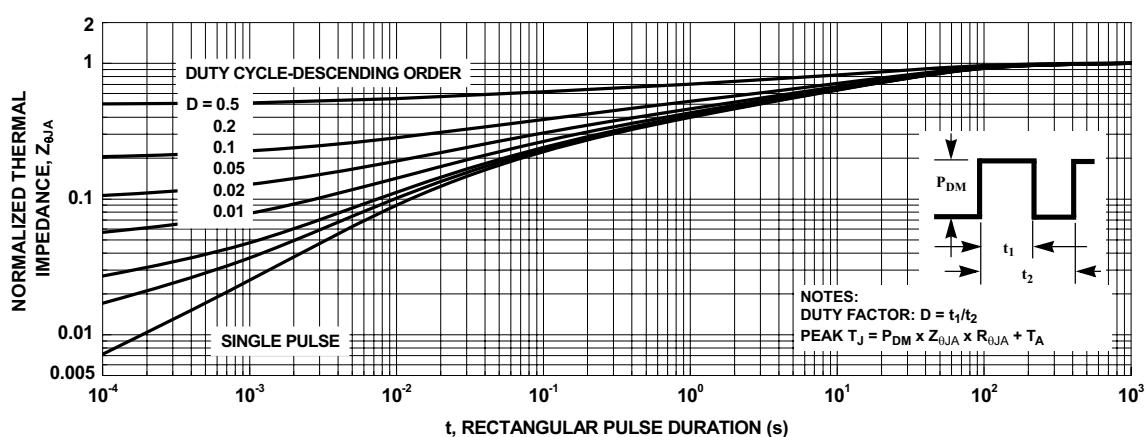



Figure 11. Transient Thermal Response Curve



ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## PUBLICATION ORDERING INFORMATION

### LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor  
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA  
**Phone:** 303-675-2175 or 800-344-3860 Toll Free USA/Canada  
**Fax:** 303-675-2176 or 800-344-3867 Toll Free USA/Canada  
**Email:** [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

**N. American Technical Support:** 800-282-9855 Toll Free  
USA/Canada

**Europe, Middle East and Africa Technical Support:**  
Phone: 421 33 790 2910

**Japan Customer Focus Center**  
Phone: 81-3-5817-1050

**ON Semiconductor Website:** [www.onsemi.com](http://www.onsemi.com)

**Order Literature:** <http://www.onsemi.com/orderlit>

For additional information, please contact your local  
Sales Representative

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[ON Semiconductor:](#)

[FDMA1023PZ](#) [FDMA1023PZ-F106](#)