

# FDMA3023PZ

## Dual P-Channel PowerTrench® MOSFET

-30 V, -2.9 A, 90 mΩ

### Features

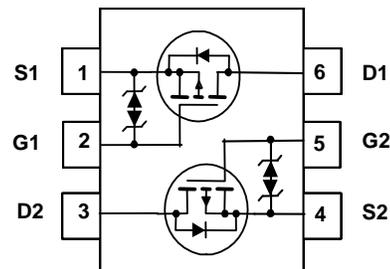
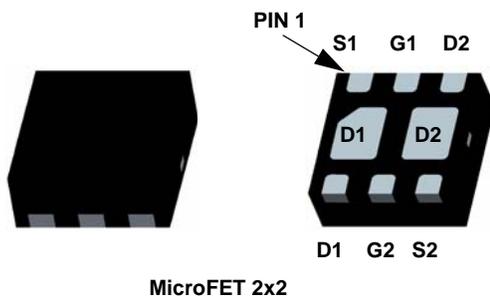
- Max  $r_{DS(on)}$  = 90 mΩ at  $V_{GS} = -4.5$  V,  $I_D = -2.9$  A
- Max  $r_{DS(on)}$  = 130 mΩ at  $V_{GS} = -2.5$  V,  $I_D = -2.6$  A
- Max  $r_{DS(on)}$  = 170 mΩ at  $V_{GS} = -1.8$  V,  $I_D = -1.7$  A
- Max  $r_{DS(on)}$  = 240 mΩ at  $V_{GS} = -1.5$  V,  $I_D = -1.0$  A
- Low profile - 0.8 mm maximum - in the new package MicroFET 2x2 mm
- HBM ESD protection level > 2 kV (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 $T_A = 25$ °C unless otherwise noted

Symbol	Parameter	Rated	Units
$V_{DS}$	Drain to Source Voltage	-30	V
$V_{GS}$	Gate to Source Voltage	±8	V
$I_D$	Drain Current -Continuous (Note 1a)	-2.9	A
	-Pulsed	-6	
$P_D$	Power Dissipation (Note 1a)	1.4	W
	Power Dissipation (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
323	FDMA3023PZ	MicroFET 2X2	7"	8 mm	3000 units

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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**Off Characteristics**

$BV_{DSS}$	Drain to Source Breakdown Voltage	$I_D = -250\ \mu\text{A}, V_{GS} = 0\ \text{V}$	-30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = -250\ \mu\text{A}$ , referenced to $25\text{ }^\circ\text{C}$		-24		mV/ $^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = -24\ \text{V}, V_{GS} = 0\ \text{V}$			-1	$\mu\text{A}$
$I_{GSS}$	Gate to Source Leakage Current	$V_{GS} = \pm 8\ \text{V}, V_{DS} = 0\ \text{V}$			$\pm 100$	nA

**On Characteristics**

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = -250\ \mu\text{A}$	-0.4	-0.6	-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 $25\text{ }^\circ\text{C}$		3		mV/ $^\circ\text{C}$
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = -4.5\ \text{V}, I_D = -2.9\ \text{A}$		71	90	m $\Omega$
		$V_{GS} = -2.5\ \text{V}, I_D = -2.6\ \text{A}$		97	130	
		$V_{GS} = -1.8\ \text{V}, I_D = -1.7\ \text{A}$		122	170	
		$V_{GS} = -1.5\ \text{V}, I_D = -1.0\ \text{A}$		151	240	
		$V_{GS} = -4.5\ \text{V}, I_D = -2.9\ \text{A}, T_J = 125\text{ }^\circ\text{C}$		110	140	
$g_{FS}$	Forward Transconductance	$V_{DS} = -5\ \text{V}, I_D = -2.9\ \text{A}$		10		S

**Dynamic Characteristics**

$C_{iss}$	Input Capacitance	$V_{DS} = -15\ \text{V}, V_{GS} = 0\ \text{V},$ $f = 1\ \text{MHz}$		400	530	pF
$C_{oss}$	Output Capacitance			55	70	pF
$C_{rss}$	Reverse Transfer Capacitance			45	65	pF

**Switching Characteristics**

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = -15\ \text{V}, I_D = -1.0\ \text{A},$ $V_{GS} = -4.5\ \text{V}, R_{GEN} = 6\ \Omega$		5	10	ns
$t_r$	Rise Time			4	10	ns
$t_{d(off)}$	Turn-Off Delay Time			62	100	ns
$t_f$	Fall Time			18	33	ns
$Q_{g(TOT)}$	Total Gate Charge			7.9	11	nC
$Q_{gs}$	Gate to Source Charge	$V_{DD} = -15\ \text{V}, I_D = -2.9\ \text{A}$		0.9		nC
$Q_{gd}$	Gate to Drain "Miller" Charge	$V_{GS} = -4.5\ \text{V}$		1.9		nC

**Drain-Source Diode Characteristics**

$I_S$	Maximum Continuous Drain-Source 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	$I_F = -2.9\ \text{A}, di/dt = 100\ \text{A}/\mu\text{s}$		18	33	ns
$Q_{rr}$	Reverse Recovery Charge			6.6	13	nC

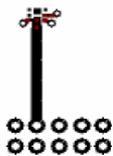
**Notes:**

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)  $R_{\theta JA} = 86$  °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)  $R_{\theta JA} = 173$  °C/W when mounted on a minimum pad of 2 oz copper. For single operation.
- (c)  $R_{\theta JA} = 69$  °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)  $R_{\theta JA} = 151$  °C/W when mounted on a minimum pad of 2 oz copper. For dual operation.



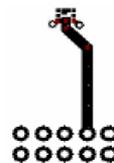
a) 86 °C/W when mounted on a 1 in<sup>2</sup> pad of 2 oz copper.



b) 173 °C/W when mounted on a minimum pad of 2 oz copper.



c) 69 °C/W when mounted on a 1 in<sup>2</sup> pad of 2 oz copper.

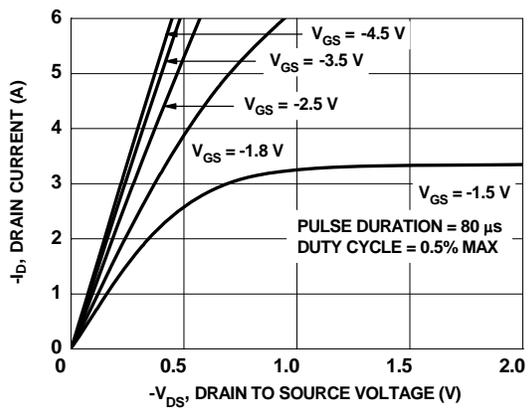


d) 151 °C/W when mounted on a minimum pad of 2 oz copper.

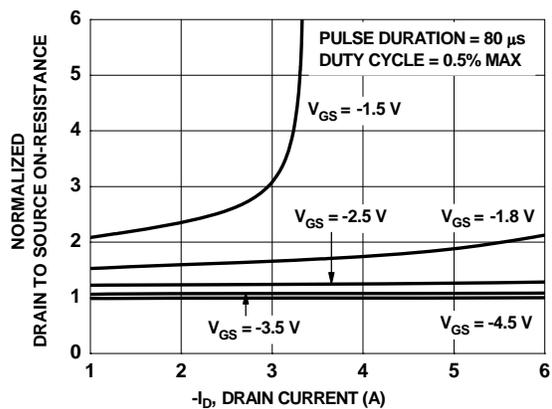
2. Pulse Test : Pulse Width < 300 us, Duty Cycle < 2.0%

3. The diode connected between the gate and source serves only as protection against ESD. No gate overvoltage rating is implied.

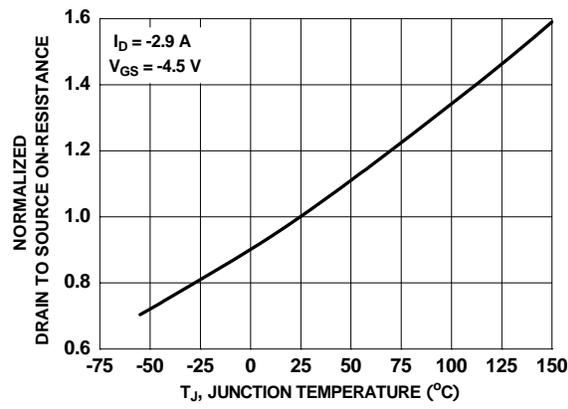
**Typical Characteristics**  $T_J = 25\text{ }^\circ\text{C}$  unless otherwise noted



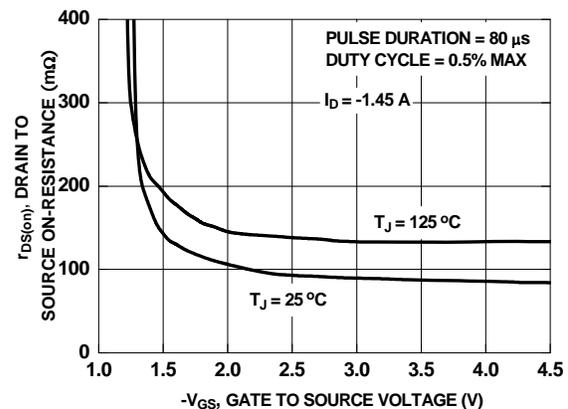
**Figure 1. On Region Characteristics**



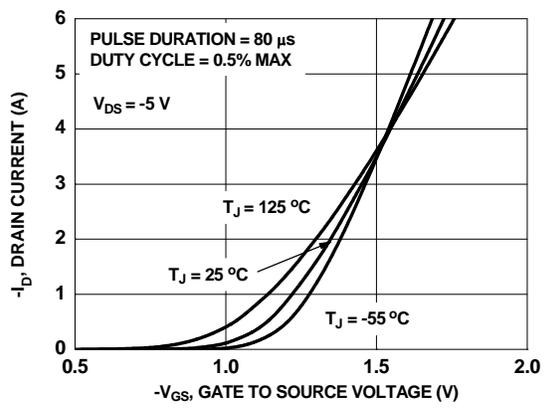
**Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage**



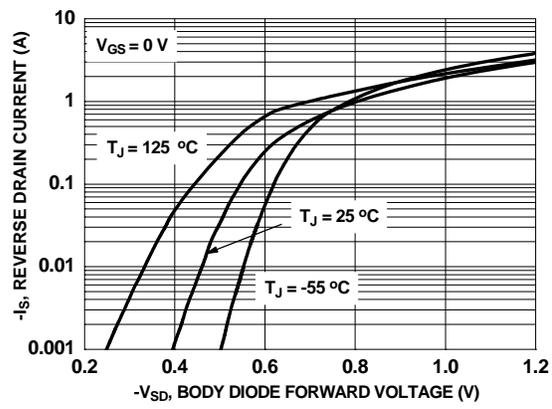
**Figure 3. Normalized On Resistance vs Junction Temperature**



**Figure 4. On-Resistance vs Gate to Source Voltage**

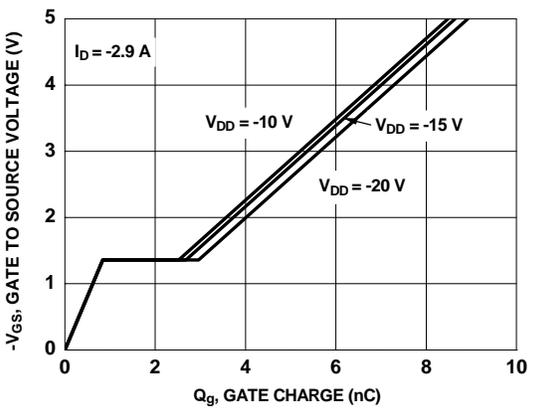


**Figure 5. Transfer Characteristics**

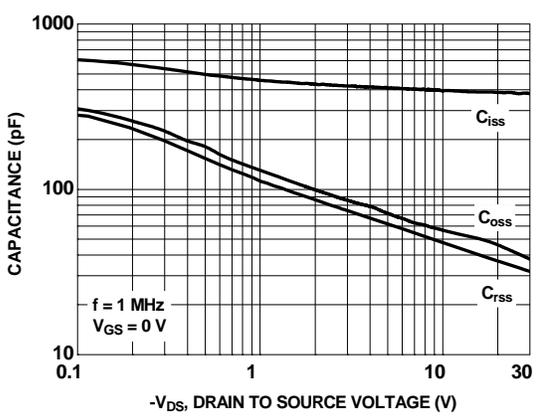


**Figure 6. Source to Drain Diode Forward Voltage vs Source Current**

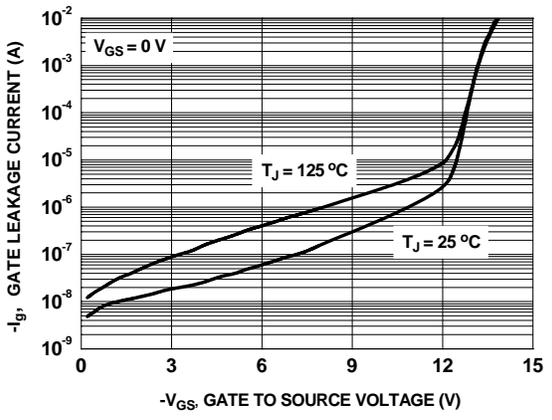
**Typical Characteristics**  $T_J = 25^\circ\text{C}$  unless otherwise noted



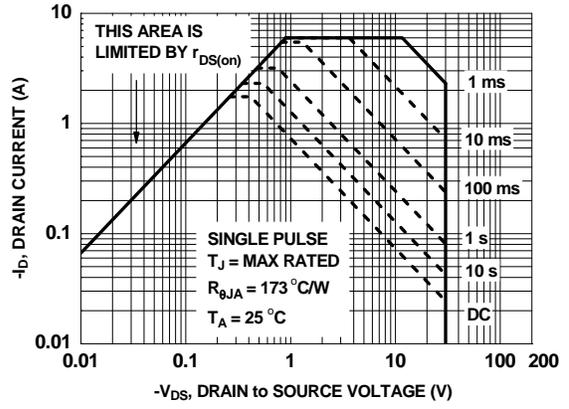
**Figure 7. Gate Charge Characteristics**



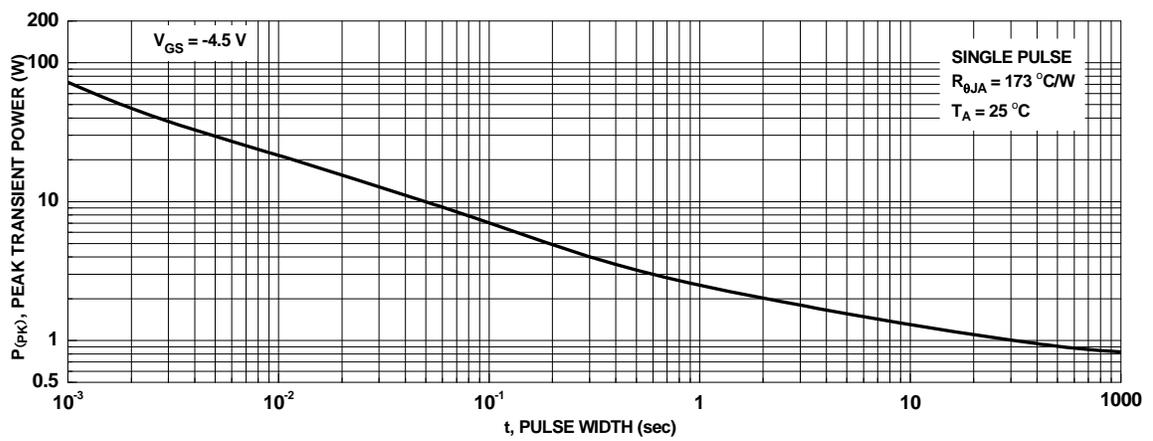
**Figure 8. Capacitance vs Drain to Source Voltage**



**Figure 9. Gate Leakage vs Gate to Source Voltage**

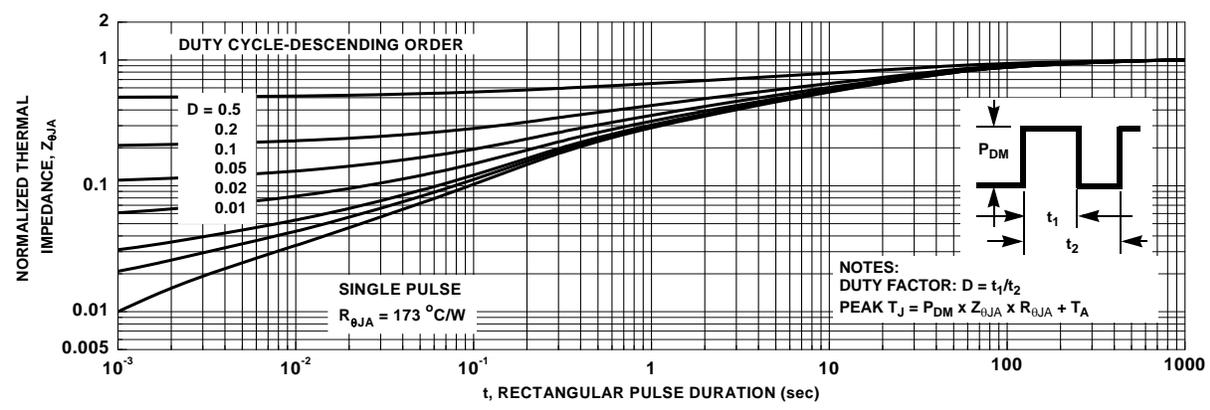


**Figure 10. Forward Bias Safe Operating Area**



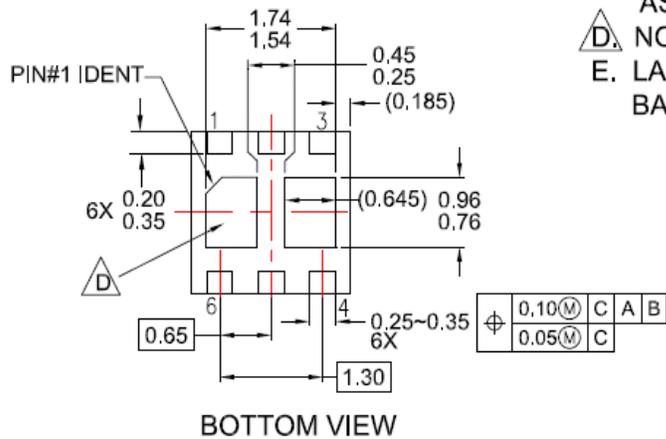
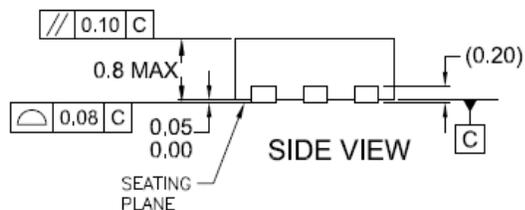
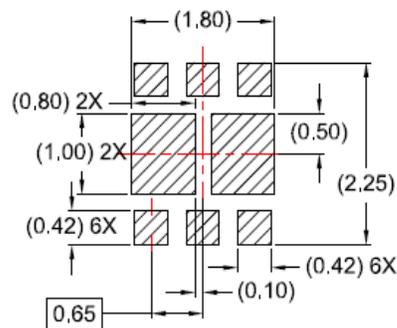
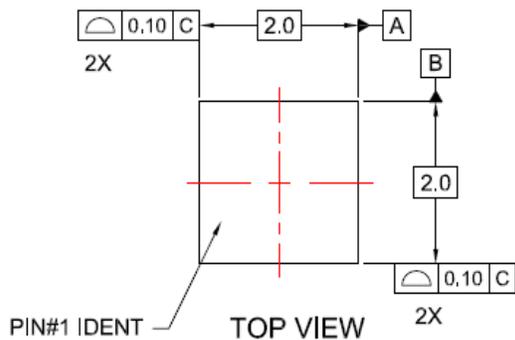
**Figure 11. Single Pulse Maximum Power Dissipation**

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



**Figure 12. Junction-to-Ambient Transient Thermal Response Curve**

## Dimensional Outline and Pad Layout



### NOTES:

- A. CONFORMS TO JEDEC REGISTRATION MO-229, VARIATION VCCC EXCEPT AS NOTED.
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 2009.
- D. NON-JEDEC DUAL DAP
- E. LAND PATTERN RECOMMENDATION IS BASED ON FSC DESIGN ONLY.



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| Fairchild Semiconductor®  | MotionMax™  | SuperSOT™-3   | Ultra FRFET™  |
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| FACT®   | mWSaver™  | SuperSOT™-8   | VCX™  |
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**Definition of Terms**

Datasheet Identification	Product Status	Definition
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Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.

Rev. I61