FAIRCHILD SEMICONDUCTOR®

March 2007

FDMA1023PZ

Dual P-Channel PowerTrench® MOSFET

–20V, –3.7A, 72mΩ

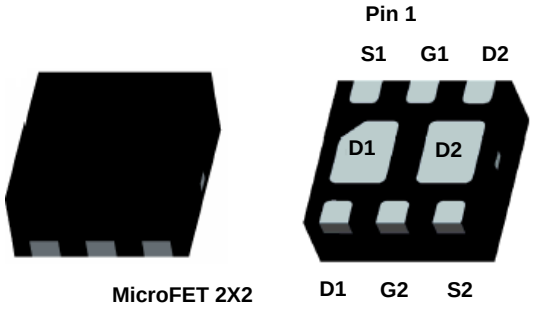
Features

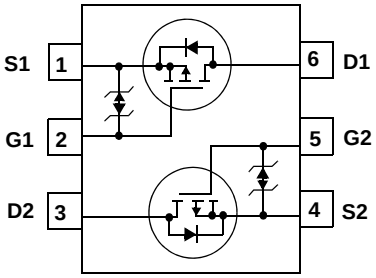
- Max $r_{DS(on)}$ = 72mΩ at V_{GS} = –4.5V, I_D = –3.7A
- Max $r_{DS(on)}$ = 95mΩ at V_{GS} = –2.5V, I_D = –3.2A
- Max $r_{DS(on)}$ = 130mΩ at V_{GS} = –1.8V, I_D = –2.0A
- Max $r_{DS(on)}$ = 195mΩ at V_{GS} = –1.5V, I_D = –1.0A
- Low profile - 0.8 mm maximum - in the new package MicroFET 2x2 mm
- RoHS Compliant

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		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 Single Operation, Junction to Ambient	(Note 1c)	69	
$R_{\theta JA}$	Thermal Resistance for Single 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°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = –250μA, V_{GS} = 0V	–20			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = –250μA, referenced to 25°C		–11		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = –16V, V_{GS} = 0V			–1	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±8V, V_{DS} = 0V			±10	μA
On Characteristics						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = –250μA	–0.4	–0.7	–1.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = –250μA, referenced to 25°C		2.5		mV/°C
$r_{DS(on)}$	Static Drain to Source On-Resistance	V_{GS} = –4.5V, I_D = –3.7A		60	72	mΩ
		V_{GS} = –2.5V, I_D = –3.2A		75	95	
		V_{GS} = –1.8V, I_D = –2.0A		100	130	
		V_{GS} = –1.5V, I_D = –1.0A		130	195	
		V_{GS} = –4.5V, I_D = –3.7A,T_J =125°C		81	91	
g_{FS}	Forward Transconductance	V_{DS} = –5V, I_D = –3.7A		12		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = –10V, V_{GS} = 0V, f = 1MHz		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} = –10V, I_D = –1A V_{GS} = –4.5V, R_{GEN} = 6Ω		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} = –10V, I_D = –3.7A V_{GS} = –4.5V		8.6	12	nC
Q_{gs}	Gate to Source Gate Charge			0.7		nC
Q_{gd}	Gate to Drain “Miller” Charge			2.0		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} = 0V, I_S = –1.1A (Note 2)		–0.8	–1.2	V
t_{rr}	Reverse Recovery Time	I_F = –3.7A, di/dt = 100A/μs		32	48	ns
Q_{rr}	Reverse Recovery Charge			15	23	nC

Notes:

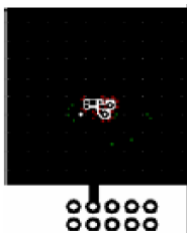
1: $R_{\theta JA}$ is determined with the device mounted on a 1 in^2 oz. copper pad on a 1.5 x 1.5 in. board of FR-4 material. $R_{\theta JC}$ is guaranteed by design while $R_{\theta JA}$ is determined by the user's board design.

(a) $R_{\theta JA}$ = 86°C/W when mounted on a 1in^2 pad of 2 oz copper, 1.5" x 1.5" x 0.062" thick PCB

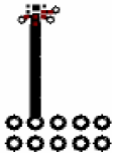
(b) $R_{\theta JA}$ = 173°C/W when mounted on a minimum pad of 2 oz copper

(c) $R_{\theta JA}$ = 69°C/W when mounted on a 1in^2 pad of 2 oz copper, 1.5" x 1.5" x 0.062" thick PCB.

(d) $R_{\theta JA}$ = 151°C/W when mounted on a minimum pad of 2 oz copper.

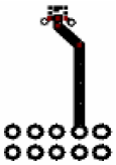


a)86°C/W when mounted on a 1in^2 pad of 2 oz copper.



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

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



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

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

Typical Characteristics T_J = 25°C unless otherwise noted

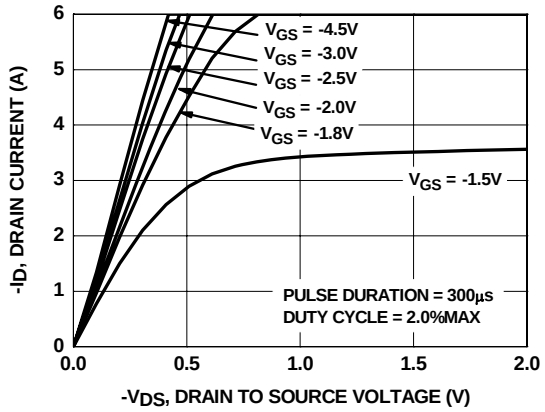


Figure 1. On Region Characteristics

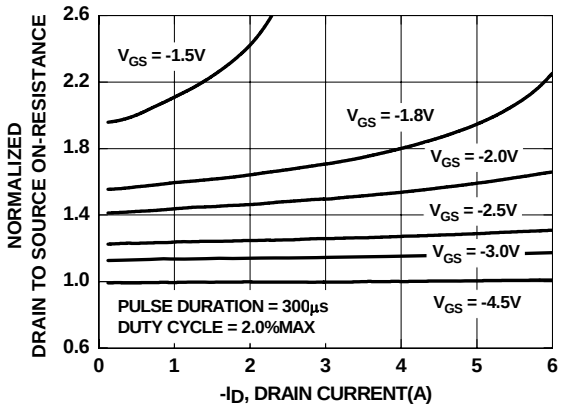


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

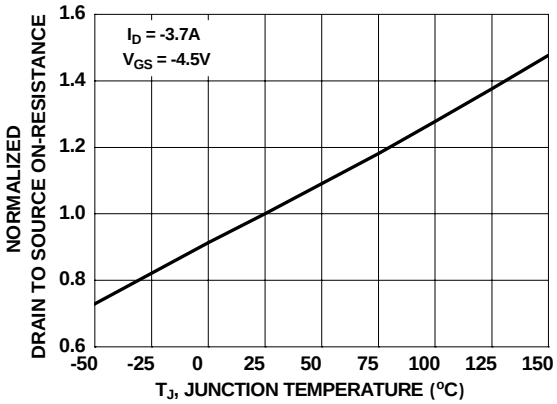


Figure 3. Normalized On-Resistance vs Junction Temperature

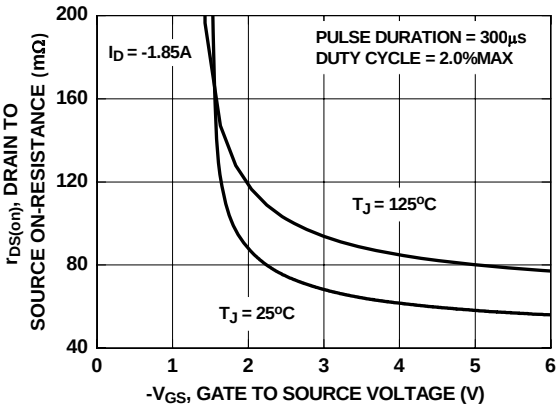


Figure 4. On-Resistance vs Gate to Source Voltage

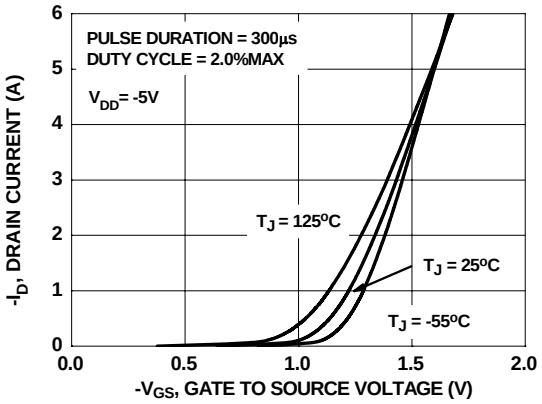


Figure 5. Transfer Characteristics

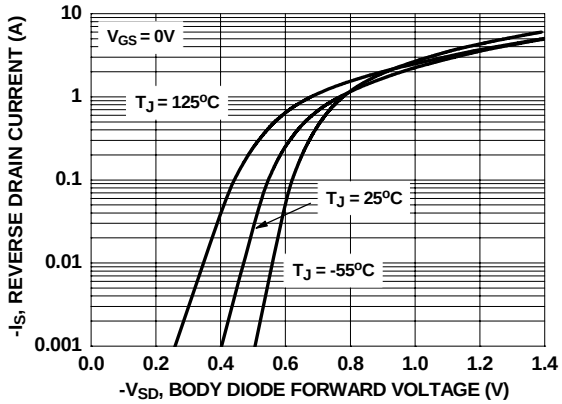


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics T_J = 25°C unless otherwise noted

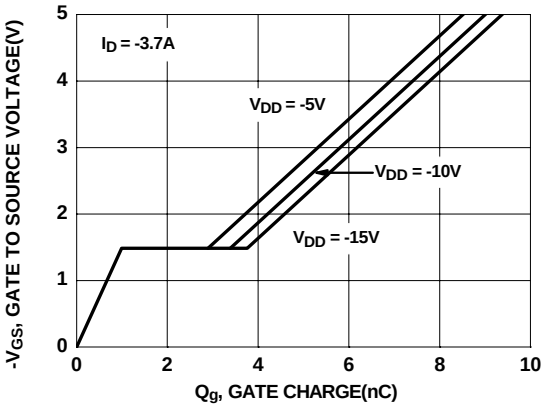


Figure 7. Gate Charge Characteristics

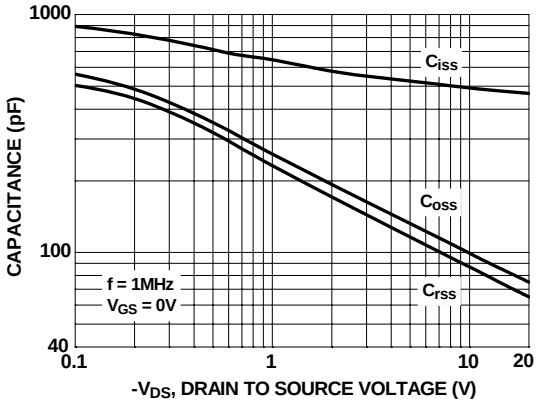


Figure 8. Capacitance Characteristics

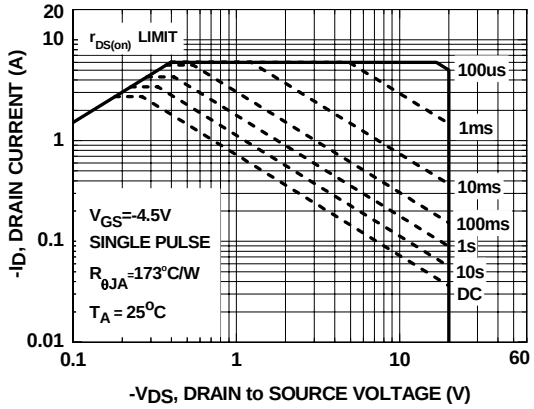


Figure 9. Forward Bias Safe Operating Area

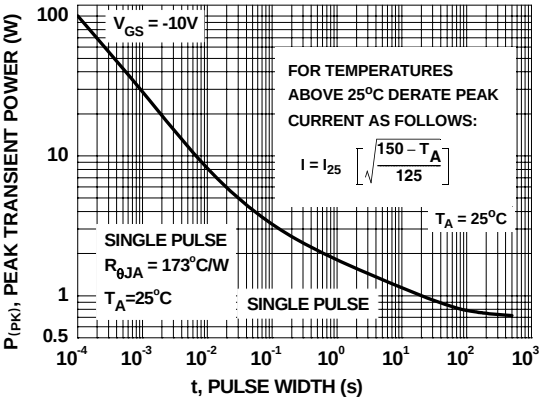


Figure 10. Single Pulse Maximum Power Dissipation

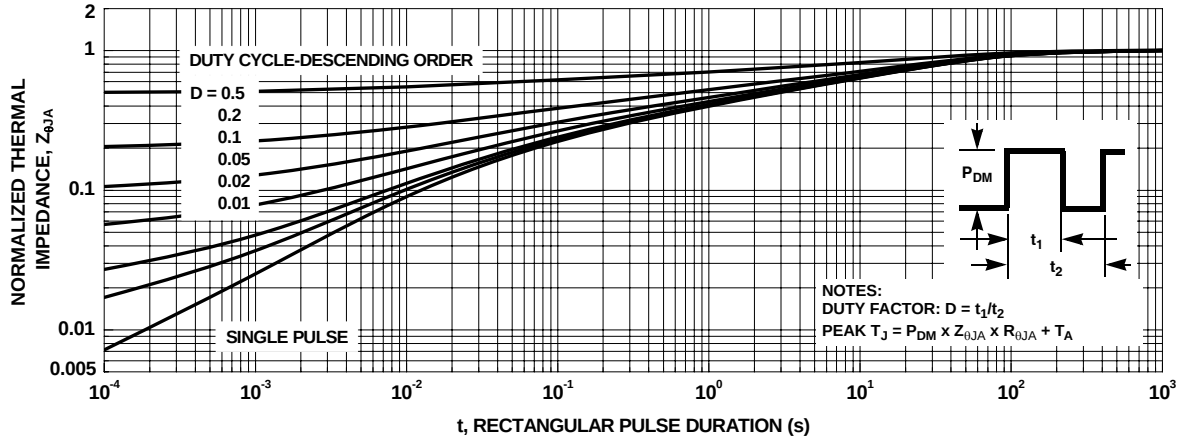
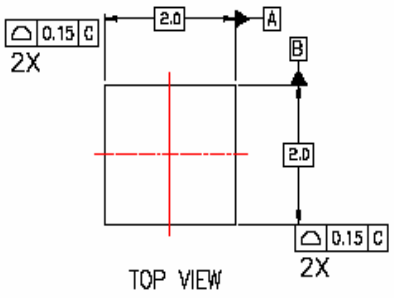
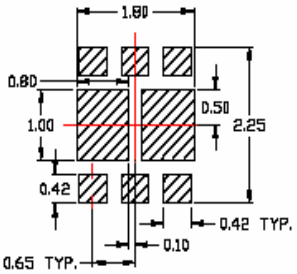


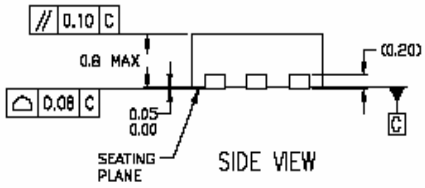
Figure 11. Transient Thermal Response Curve



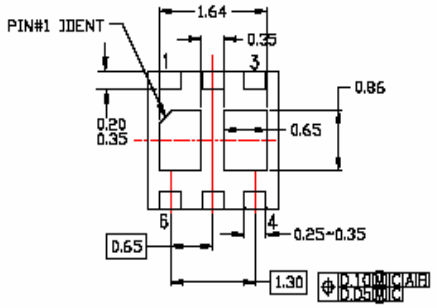
TOP VIEW



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

FAIRCHILD
SEMICONDUCTOR®

TRADEMARKS

The following are registered and unregistered trademarks Fairchild Semiconductor owns or is authorized to use and is not intended to be an exhaustive list of all such trademarks.

ACEx®	HiSeC™	Programmable Active Droop™	TinyLogic®
Across the board. Around the world.™	*i-Lo*™	QFET®	TINYOPTO™
ActiveArray™	ImpliedDisconnect™	QS™	TinyPower™
Bottomless™	IntelliMAX™	QT Optoelectronics™	TinyWire™
Build it Now™	ISOPLANAR™	Quiet Series™	TruTranslation™
CoolFET™	MICROCOUPLER™	RapidConfigure™	μSerDes™
CROSSVOLT™	MicroPak™	RapidConnect™	UHC®
CTL™	MICROWIRE™	ScalarPump™	UniFET™
Current Transfer Logic™	MSX™	SMART START™	VCX™
DOME™	MSXPro™	SPM®	Wire™
E^2CMOS™	OCX™	STEALTH™	
EcoSPARK®	OCXPro™	SuperFET™	
EnSigna™	OPTOLOGIC®	SuperSOT™-3	
FACT Quiet Series™	OPTOPLANAR®	SuperSOT™-6	
FACT®	PACMAN™	SuperSOT™-8	
FAST®	POP™	SyncFET™	
FASTr™	Power220®	TCM™	
FPS™	Power247®	The Power Franchise®	
FRFET®	PowerEdge™	™	
GlobalOptoisolator™	PowerSaver™	TinyBoost™	
GTO™	PowerTrench®	TinyBuck™	

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.

2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

PRODUCT STATUS DEFINITIONS
Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This 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	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild Semiconductor.The datasheet is printed for reference information only.

Rev. I24