FAIRCHILD SEMICONDUCTOR®

September 2008

FDMA1027P

Dual P-Channel PowerTrench® MOSFET

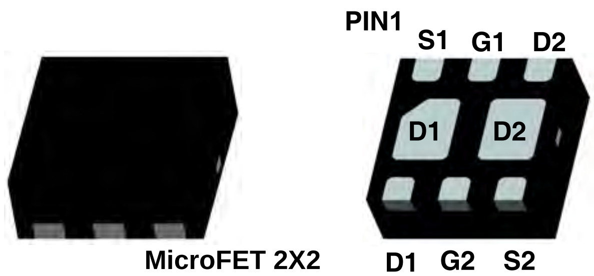
General Description

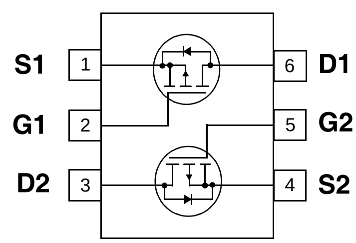
This device is designed specifically as a single package solution for the battery charge switch in cellular handset and other ultra-portable applications. It features two independent P-Channel MOSFETs with low on-state resistance for minimum conduction losses. When connected in the typical common source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

The MicroFET 2x2 package offers exceptional thermal performance for it's physical size and is well suited to linear mode applications.

Features

- -3.0 A, -20V. $R_{DS(ON)}$ = 120 mΩ @ V_{GS} = -4.5 V
  $R_{DS(ON)}$ = 160 mΩ @ V_{GS} = -2.5 V
  $R_{DS(ON)}$ = 240 mΩ @ V_{GS} = -1.8 V
- Low Profile - 0.8 mm maximun - in the new package MicroFET 2x2 mm
- RoHS Compliant





Absolute Maximum Ratings T_A = 25°C unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DSS}	MOSFET Drain-Source Voltage	-20	V
V_{GSS}	MOSFET Gate-Source Voltage	±8	V
I_D	Drain Current -Continuous (Note 1a)	-3.0	A
	-Pulsed	-6	
P_D	Power dissipation for Single Operation (Note 1a)	1.4	W
	Power dissipation for Single Operation (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, Junction-to-Ambient (Note 1a)	86 (Single Operation)	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1b)	173 (Single Operation)	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	69 (Dual Operation)	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	151 (Dual Operation)	

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape Width	Quantity
027	FDMA1027P	7"	8mm	3000 units

Electrical Characteristics T_A = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units

Off Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = -250µA	-20	-	-	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = -250µA, Referenced to 25°C	-	-12	-	mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -16V, V_{GS} = 0V	-	-	-1	µA
I_{GSS}	Gate-Body Leakage,	V_{GS} = ±8V, V_{DS} = 0V	-	-	±100	nA

On Characteristics (Note 2)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = -250µA	-0.4	-0.7	-1.3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I_D = -250µA, Referenced to 25°C	-	2	-	mV/°C
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} = -4.5V, I_D = -3.0A	-	90	120	mΩ
		V_{GS} = -2.5V, I_D = -2.5A	-	120	160	
		V_{GS} = -1.8V, I_D = -1.0A	-	172	240	
		V_{GS} = -4.5V, I_D = -3.0A, T_J = 125°C	-	118	160	
$I_{D(on)}$	On-State Drain Current	V_{GS} = -4.5V, V_{DS} = -5V	-20	-	-	A
g_{FS}	Forward Transconductance	V_{DS} = -5V, I_D = -3.0A	-	7	-	S

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
C_{iss}	Input Capacitance	V_{DS} = -10V, V_{GS} = 0V, f = 1.0MHz	-	435	-	pF
C_{oss}	Output Capacitance		-	80	-	pF
C_{rss}	Reverse Transfer Capacitance		-	45	-	pF

Switching Characteristics (Note 2)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = -10V, I_D = -1A, V_{GS} = -4.5V, R_{GEN} = 6Ω	-	9	18	ns
t_r	Turn-On Rise Time		-	11	19	ns
$t_{d(off)}$	Turn-Off Delay Time		-	15	27	ns
t_f	Turn-Off Fall Time		-	6	12	ns
Q_g	Total Gate Charge	V_{DS} = -10V, I_D = -3.0A, V_{GS} = -4.5V	-	4	6	nC
Q_{gs}	Gate-Source Charge		-	0.8	-	nC
Q_{gd}	Gate-Drain Charge		-	0.9	-	nC

Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
I_S	Maximum Continuous Drain-Source Diode Forward Current		-	-	-1.1	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0V, I_S = -1.1 A (Note 2)	-	-0.8	-1.2	V
t_{rr}	Diode Reverse Recovery Time	I_F= -3.0A, dI_F/dt=100A/µs	-	17	-	ns
Q_{rr}	Diode Reverse Recovery Charge		-	6	-	nC

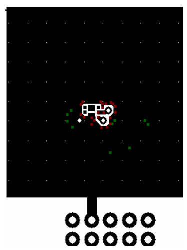
Electrical Characteristics $T_A = 25°C$ unless otherwise noted

Notes:

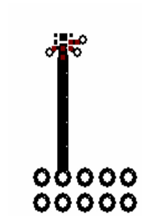
1. $R_{\theta JA}$ is determined with the device mounted on a 1 in^2 oz. copper pad on a 1.5 x 1.5 in. board of FR-4 material. $R_{\theta JC}$ is guaranteed by design while $R_{\theta JA}$ is determined by the user's board design.

(a) $R_{\theta JA}$ = 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



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

Scale 1: 1 on letter size paper

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

Typical Characteristics

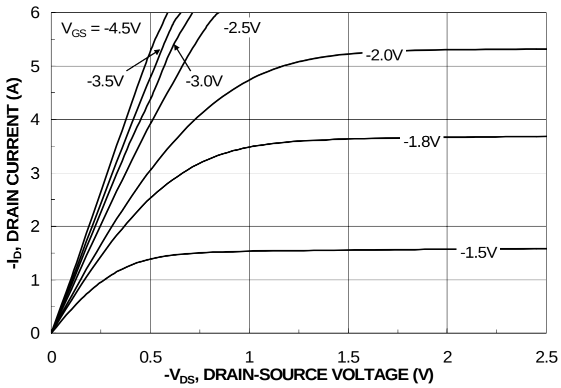


Figure 1. On-Region Characteristics

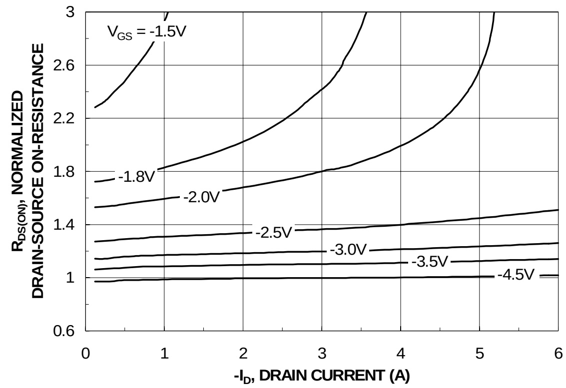


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage

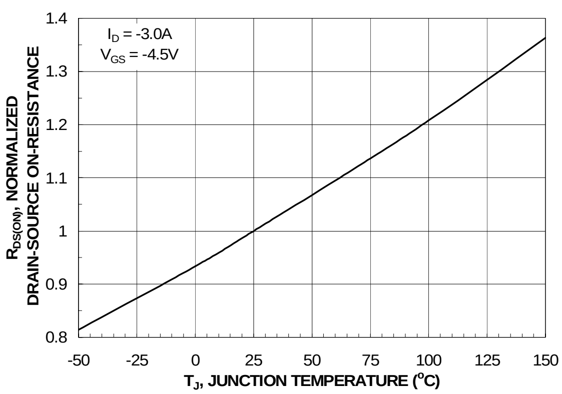


Figure 3. On-Resistance Variation with Temperature

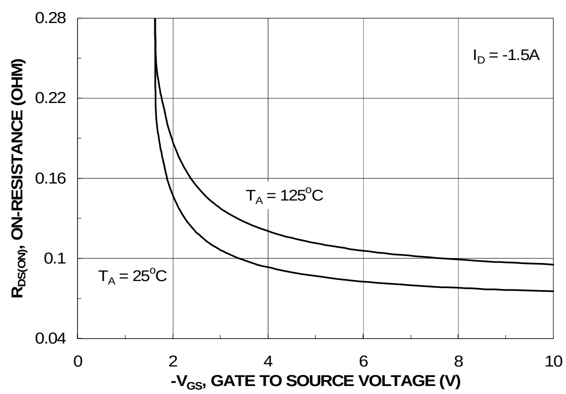


Figure 4. On-Resistance Variation with Gate-to-Source Voltage

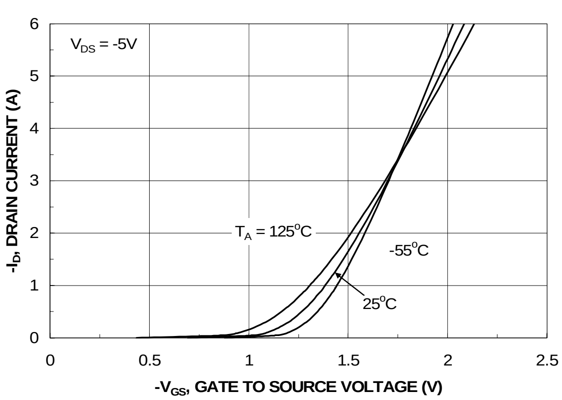


Figure 5. Transfer Characteristics

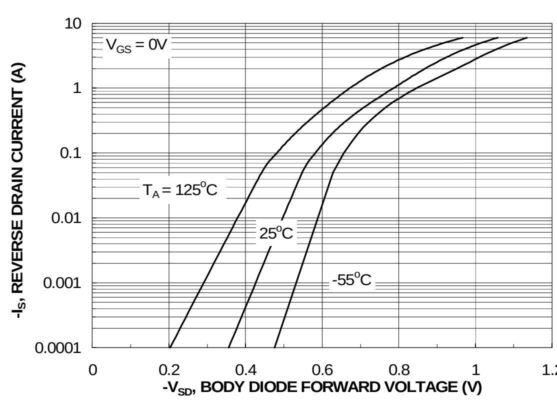


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature

Typical Characteristics

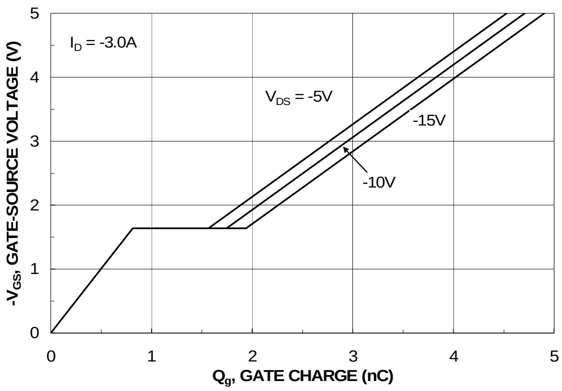


Figure 7. Gate Charge Characteristics

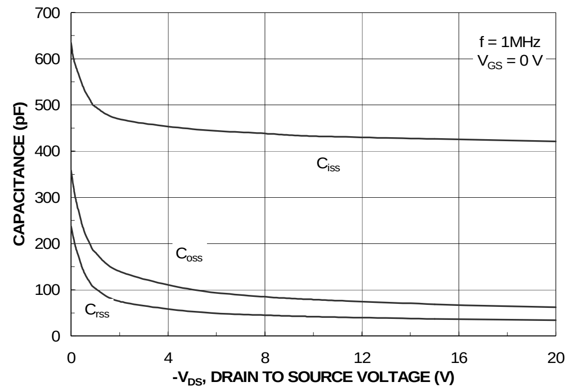


Figure 8. Capacitance Characteristics

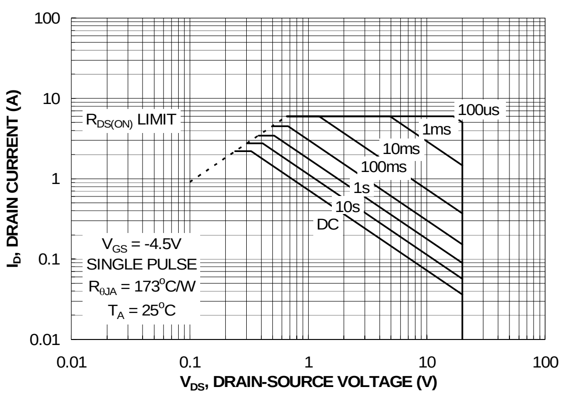


Figure 9. Maximum Safe Operation Area

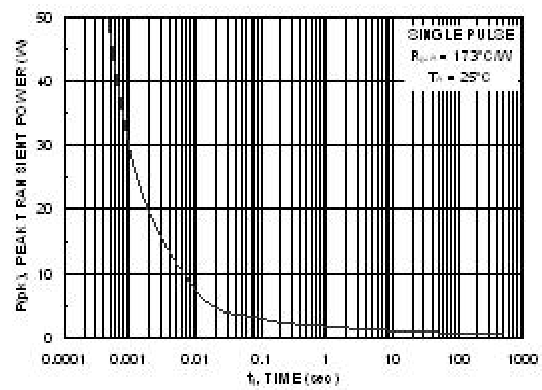


Figure 10. Single Pulse Maximum Power Dissipation

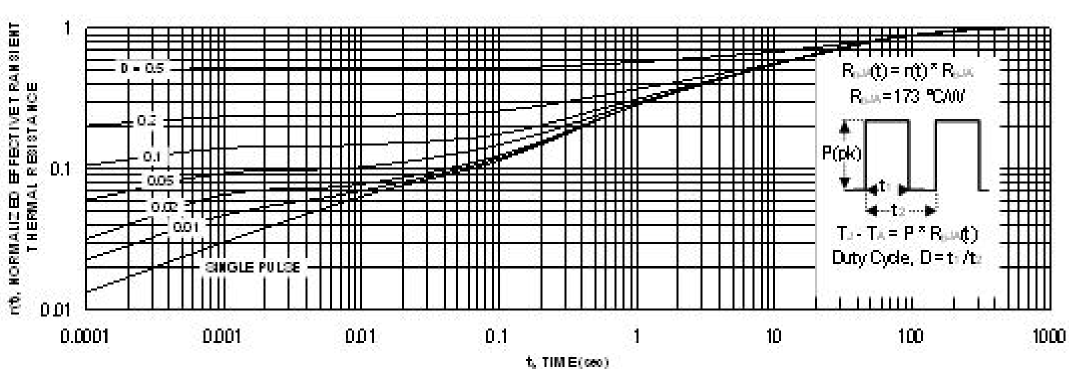
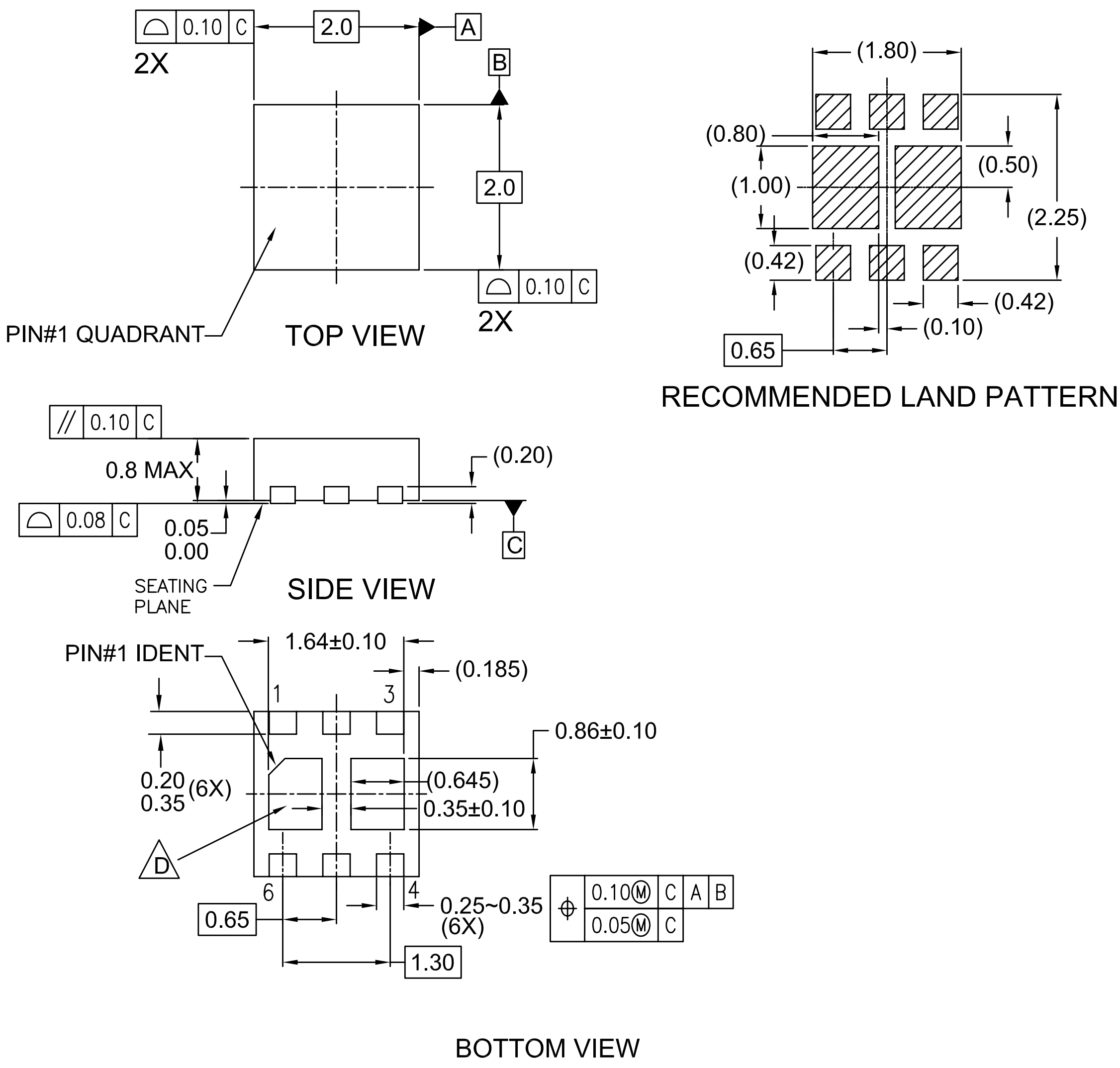


Figure 11. Transient Thermal Response Curve

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

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, 1994

D. NON-JEDEC DUAL DAP

E. DRAWING FILE NAME : MLP06Jrev3

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