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# FDMA1027P

## Dual P-Channel PowerTrench<sup>®</sup> MOSFET



FDMA1027P Dual P-Channel PowerTrench<sup>®</sup> MOSFET

### General Description

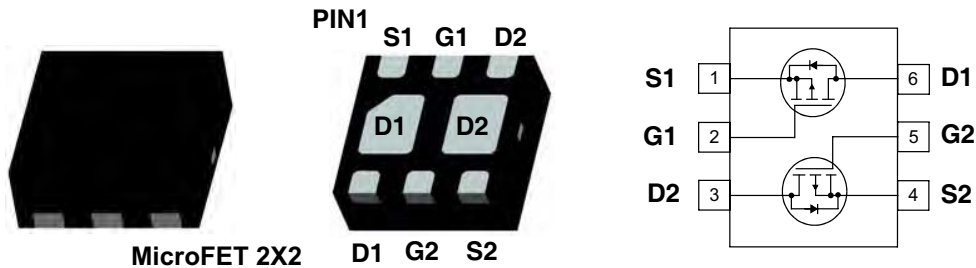
This device is designed specifically as a single package solution for the battery charge switch in cellular handset and other ultra-portable applications. It features two independent P-Channel MOSFETs with low on-state resistance for minimum conduction losses. When connected in the typical common source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

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



### Features

- -3.0 A, -20V.  $R_{DS(ON)} = 120\text{ m}\Omega @ V_{GS} = -4.5\text{ V}$   
 $R_{DS(ON)} = 160\text{ m}\Omega @ V_{GS} = -2.5\text{ V}$   
 $R_{DS(ON)} = 240\text{ m}\Omega @ V_{GS} = -1.8\text{ V}$
- Low Profile - 0.8 mm maximum - in the new package MicroFET 2x2 mm
- RoHS Compliant
- Free from halogenated compounds and antimony oxides



### Absolute Maximum Ratings $T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Ratings	Units
$V_{DSS}$	MOSFET Drain-Source Voltage	-20	V
$V_{GSS}$	MOSFET Gate-Source Voltage	$\pm 8$	V
$I_D$	Drain Current -Continuous	(Note 1a) -3.0	A
	-Pulsed	-6	
$P_D$	Power dissipation	(Note 1a) 1.4	W
		(Note 1b) 0.7	
		(Note 1c) 1.8	
		(Note 1d) 0.8	
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ\text{C}$

### Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance for Single Operation, Junction-to-Ambient	(Note 1a)	86	$^\circ\text{C/W}$
$R_{\theta JA}$	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	Reel Size	Tape Width	Quantity
027	FDMA1027P	7"	8mm	3000 units

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

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

$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = -250\mu A$	-20	-	-	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = -250\mu A$ , Referenced to $25^\circ\text{C}$	-	-12	-	$\text{mV}/^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = -16V, V_{GS} = 0V$	-	-	-1	$\mu A$
$I_{GSS}$	Gate-Body Leakage,	$V_{GS} = \pm 8V, V_{DS} = 0V$	-	-	$\pm 100$	nA

**On Characteristics** (Note 2)

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\mu A$	-0.4	-0.7	-1.3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = -250\mu A$ , Referenced to $25^\circ\text{C}$	-	2	-	$\text{mV}/^\circ\text{C}$
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = -4.5V, I_D = -3.0A$	-	90	120	m $\Omega$
		$V_{GS} = -2.5V, I_D = -2.5A$	-	120	160	
		$V_{GS} = -1.8V, I_D = -1.0A$	-	172	240	
		$V_{GS} = -4.5V, I_D = -3.0A$ , $T_J = 125^\circ\text{C}$	-	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**

$C_{iss}$	Input Capacitance	$V_{DS} = -10V, V_{GS} = 0V$ , $f = 1.0\text{MHz}$	-	435	-	pF
$C_{oss}$	Output Capacitance		-	80	-	pF
$C_{rss}$	Reverse Transfer Capacitance		-	45	-	pF

**Switching Characteristics** (Note 2)

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = -10V, I_D = -1A$ , $V_{GS} = -4.5V, R_{GEN} = 6\Omega$	-	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**

$I_S$	Maximum Continuous Drain-Source Diode Forward Current	-	-	-1.1	A	
$V_{SD}$	Drain-Source Diode Forward Voltage	$V_{GS} = 0V, I_S = -1.1A$ (Note 2)	-	-0.8	-1.2	V
$t_{rr}$	Diode Reverse Recovery Time	$I_F = -3.0A, di_F/dt = 100A/\mu s$	-	17	-	ns
$Q_{rr}$	Diode Reverse Recovery Charge		-	6	-	nC

## Electrical Characteristics $T_A = 25^\circ\text{C}$ unless otherwise noted

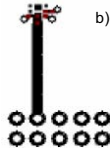
### Notes:

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



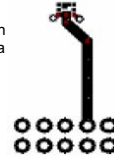
a)  $86^\circ\text{C/W}$  when mounted on a 1 in<sup>2</sup> pad of 2 oz copper.



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%

## Typical Characteristics

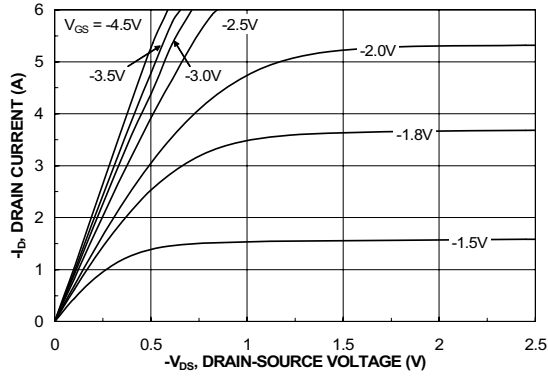


Figure 1. On-Region Characteristics

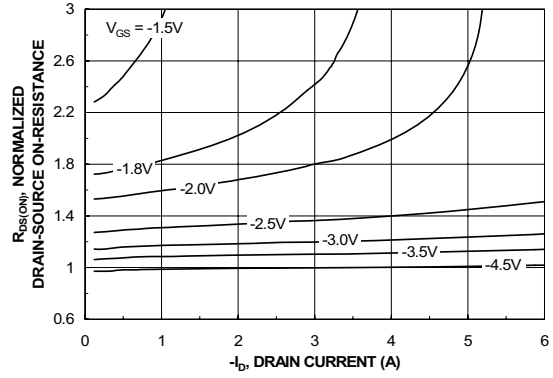


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage

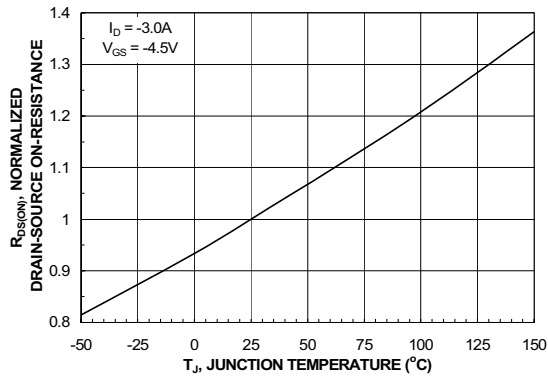


Figure 3. On-Resistance Variation with Temperature

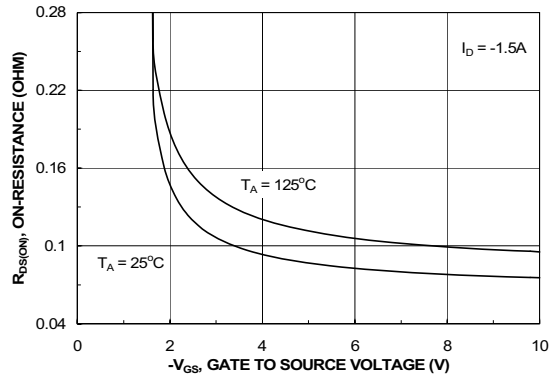


Figure 4. On-Resistance Variation with Gate-to-Source Voltage

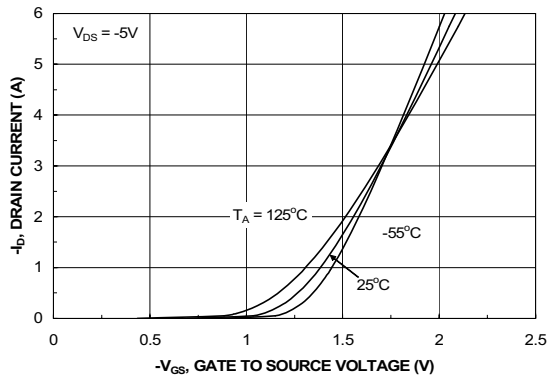


Figure 5. Transfer Characteristics

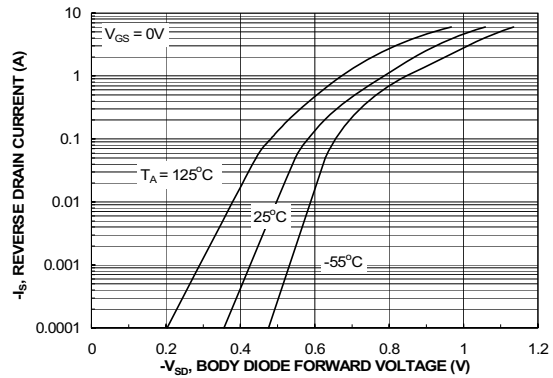


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature

### Typical Characteristics

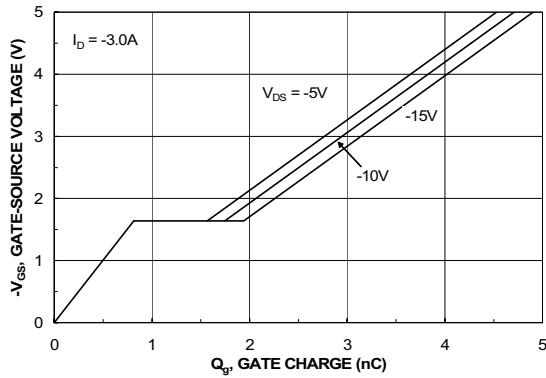


Figure 7. Gate Charge Characteristics

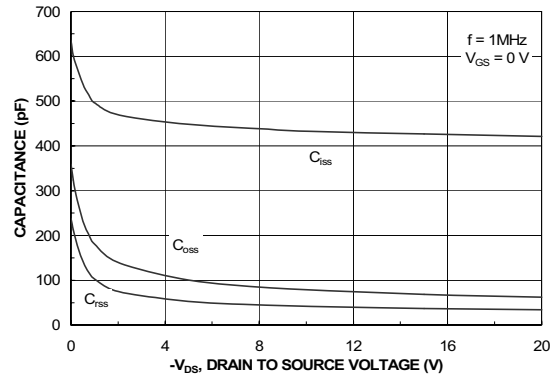


Figure 8. Capacitance Characteristics

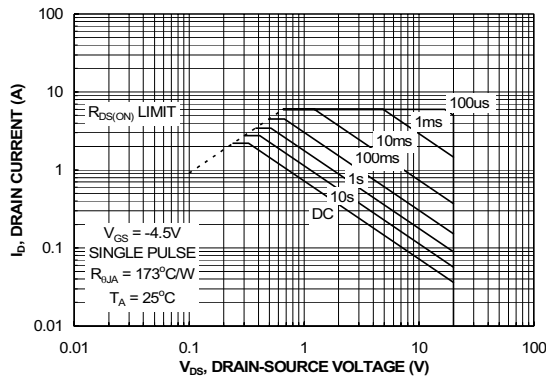


Figure 9. Maximum Safe Operation Area

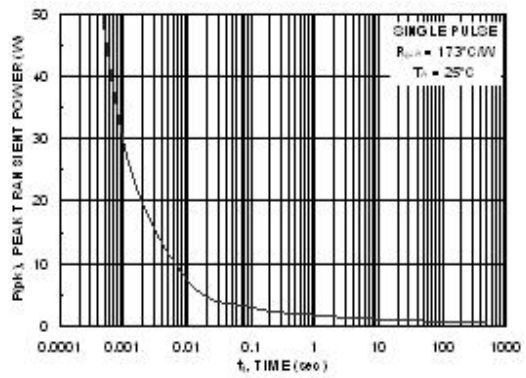


Figure 10. Single Pulse Maximum Power Dissipation

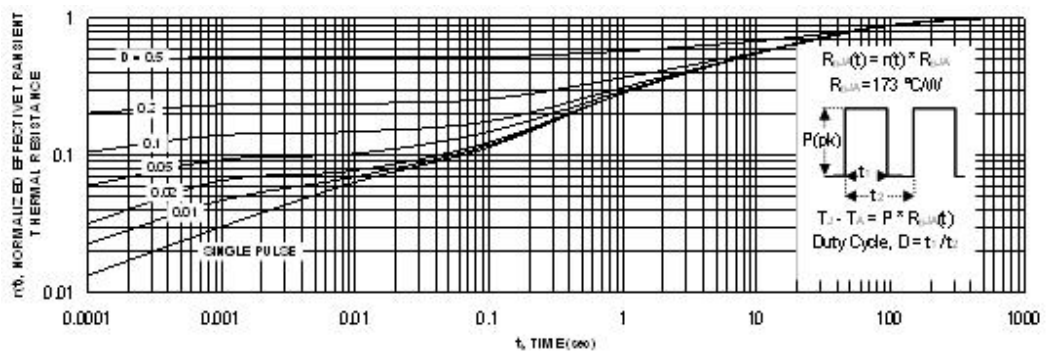
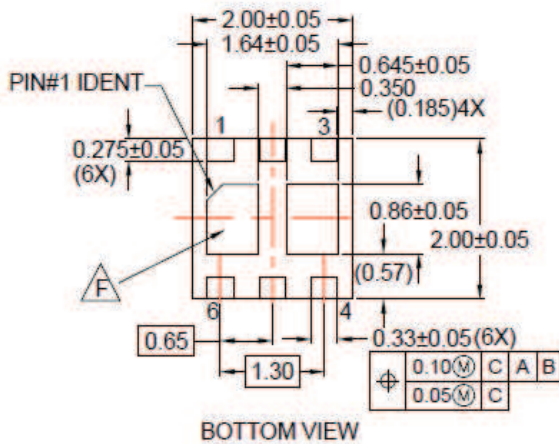
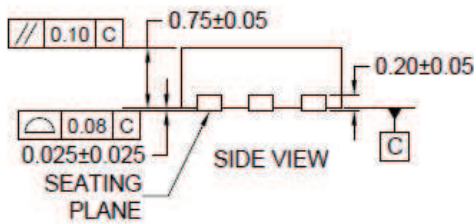
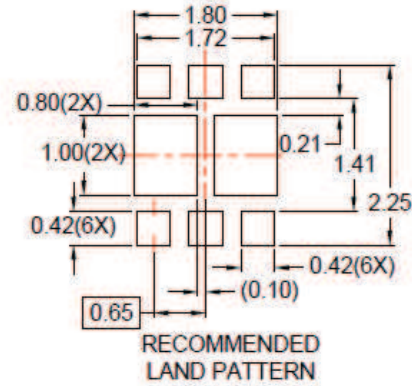
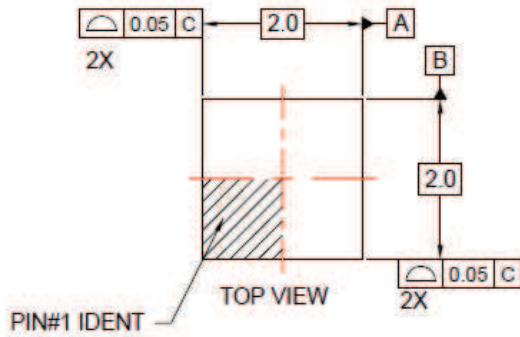


Figure 11. Transient Thermal Response Curve

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:

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