

# FDMA1029PZ

## Dual P-Channel PowerTrench® MOSFET

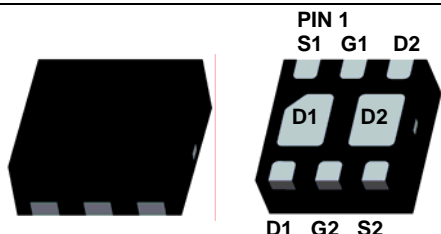
### General Description

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.

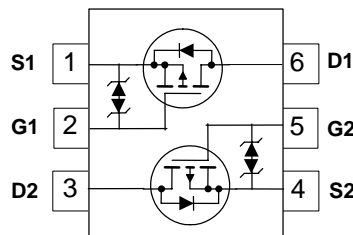
The MicroFET 2x2 package offers exceptional thermal performance for its physical size and is well suited to linear mode applications.

### Features

- -3.1 A, -20V.  $R_{DS(ON)} = 95 \text{ m}\Omega @ V_{GS} = -4.5\text{V}$   
 $R_{DS(ON)} = 141 \text{ m}\Omega @ V_{GS} = -2.5\text{V}$
- Low profile – 0.8 mm maximum – in the new package MicroFET 2x2 mm
- RoHS Compliant



MicroFET 2x2



### Absolute Maximum Ratings

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

Symbol	Parameter	Ratings	Units
$V_{DS}$	Drain-Source Voltage	-20	V
$V_{GS}$	Gate-Source Voltage	$\pm 12$	V
$I_D$	Drain Current – Continuous (Note 1a)	-3.1	A
	– Pulsed	-6	
$P_D$	Power Dissipation for Single Operation (Note 1a) (Note 1b)	1.4	W
		0.7	
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ\text{C}$

### Thermal Characteristics

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

### Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
029	FDMA1029PZ	7"	8mm	3000 units

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
<b>Off Characteristics</b>						
$BV_{DSS}$	Drain–Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = -250\ \mu\text{A}$	-20			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = -250\ \mu\text{A}$ , Referenced to $25^\circ\text{C}$		-12		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–Body Leakage	$V_{GS} = \pm 12\text{ V}, V_{DS} = 0\text{ V}$			$\pm 10$	$\mu\text{A}$
<b>On Characteristics (Note 2)</b>						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\ \mu\text{A}$	-0.6	-1.0	-1.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = -250\ \mu\text{A}$ , Referenced to $25^\circ\text{C}$		4		mV/ $^\circ\text{C}$
$R_{DS(on)}$	Static Drain–Source On–Resistance	$V_{GS} = -4.5\text{ V}, I_D = -3.1\text{ A}$ $V_{GS} = -2.5\text{ V}, I_D = -2.5\text{ A}$ $V_{GS} = -4.5\text{ V}, I_D = -3.1\text{ A}, T_J = 125^\circ\text{C}$		60 88 87	95 141 140	m $\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS} = -10\text{ V}, I_D = -3.1\text{ A}$		-11		S
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$		540		pF
$C_{oss}$	Output Capacitance			120		pF
$C_{rss}$	Reverse Transfer Capacitance			100		pF
<b>Switching Characteristics (Note 2)</b>						
$t_{d(on)}$	Turn–On Delay Time	$V_{DD} = -10\text{ V}, I_D = -1\text{ A},$ $V_{GS} = -4.5\text{ V}, R_{GEN} = 6\ \Omega$		13	24	ns
$t_r$	Turn–On Rise Time			11	20	ns
$t_{d(off)}$	Turn–Off Delay Time			37	59	ns
$t_f$	Turn–Off Fall Time			36	58	ns
$Q_g$	Total Gate Charge	$V_{DS} = -10\text{ V}, I_D = -3.1\text{ A},$ $V_{GS} = -4.5\text{ V}$		7.0	10	nC
$Q_{gs}$	Gate–Source Charge			1.1		nC
$Q_{gd}$	Gate–Drain Charge			2.4		nC

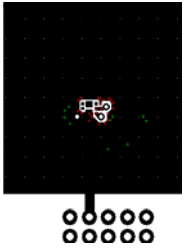
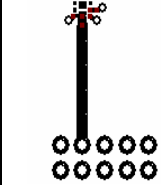
### Electrical Characteristics

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
<b>Drain–Source Diode Characteristics and Maximum Ratings</b>						
$I_S$	Maximum Continuous Drain–Source Diode Forward Current				–1.1	A
$V_{SD}$	Drain–Source Diode Forward Voltage	$V_{GS} = 0\text{ V}$ , $I_S = -1.1\text{ A}$ (Note 2)		–0.8	–1.2	V
$t_{rr}$	Diode Reverse Recovery Time	$I_F = -3.1\text{ A}$ , $di_F/dt = 100\text{ A}/\mu\text{s}$		25		ns
$Q_{rr}$	Diode Reverse Recovery Charge			9		nC

**Notes:**

- $R_{\theta JA}$  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.
  - $R_{\theta JA} = 86^\circ\text{C/W}$  when mounted on a 1 in<sup>2</sup> pad of 2 oz copper, 1.5" x 1.5" x 0.062" thick PCB
  - $R_{\theta JA} = 173^\circ\text{C/W}$  when mounted on a minimum pad of 2 oz copper
  - $R_{\theta JA} = 69^\circ\text{C/W}$  when mounted on a 1 in<sup>2</sup> pad of 2 oz copper, 1.5" x 1.5" x 0.062" thick PCB
  - $R_{\theta JA} = 151^\circ\text{C/W}$  when mounted on a minimum pad of 2 oz copper

	<p>a) 86°C/W when mounted on a 1 in<sup>2</sup> pad of 2 oz copper</p>		<p>b) 173°C/W when mounted on a minimum pad of 2 oz copper</p>
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Scale 1 : 1 on letter size paper

- Pulse Test: Pulse Width < 300 $\mu\text{s}$ , Duty Cycle < 2.0%

## Typical Characteristics

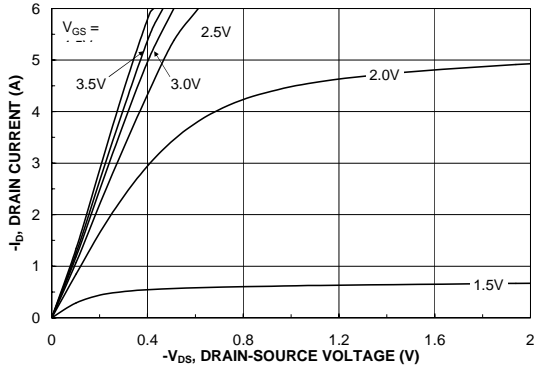


Figure 1. On-Region Characteristics.

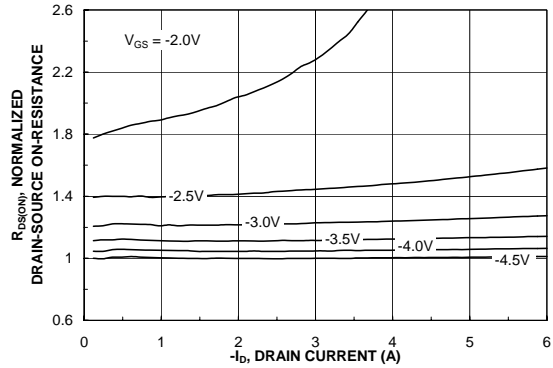


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

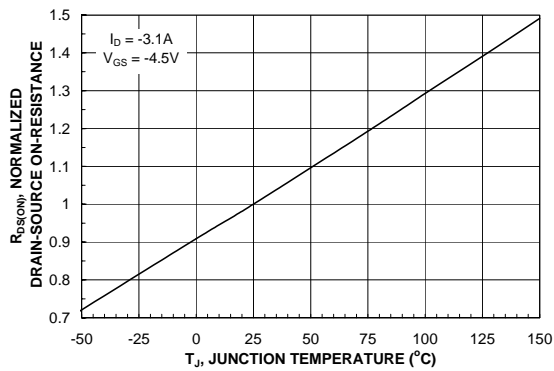


Figure 3. On-Resistance Variation with Temperature.

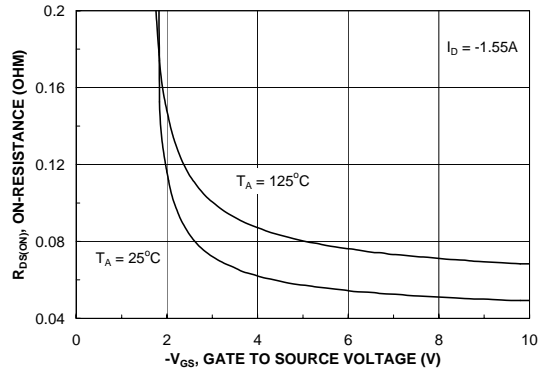


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

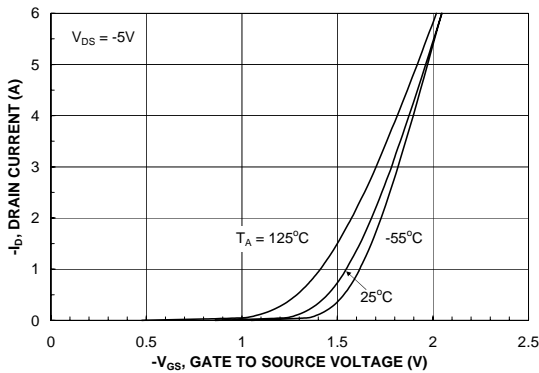


Figure 5. Transfer Characteristics.

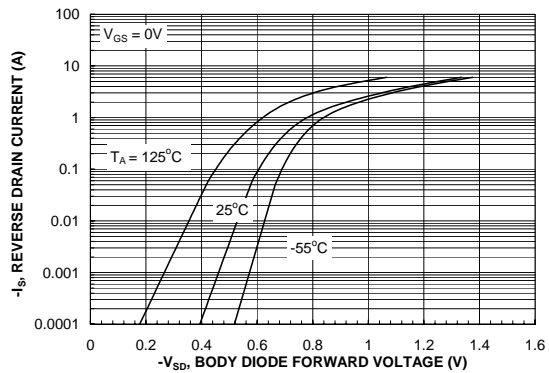
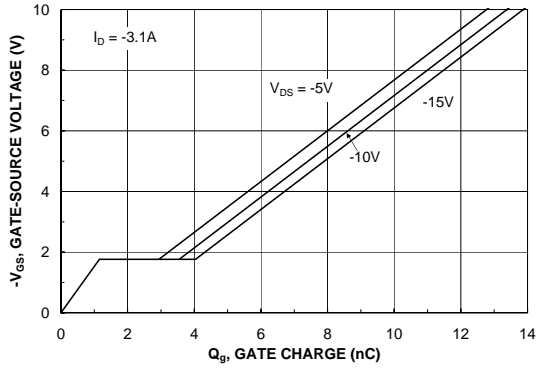
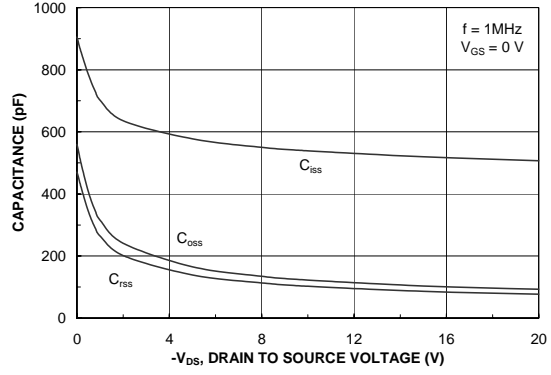


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

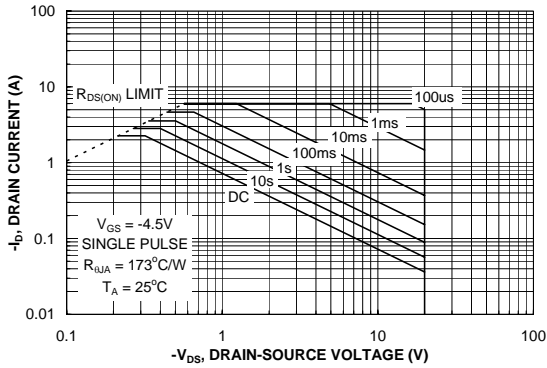
### Typical Characteristics



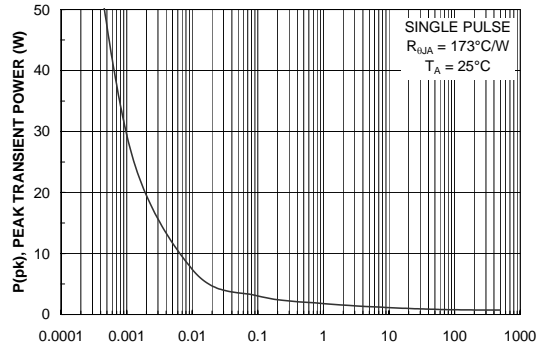
**Figure 7. Gate Charge Characteristics.**



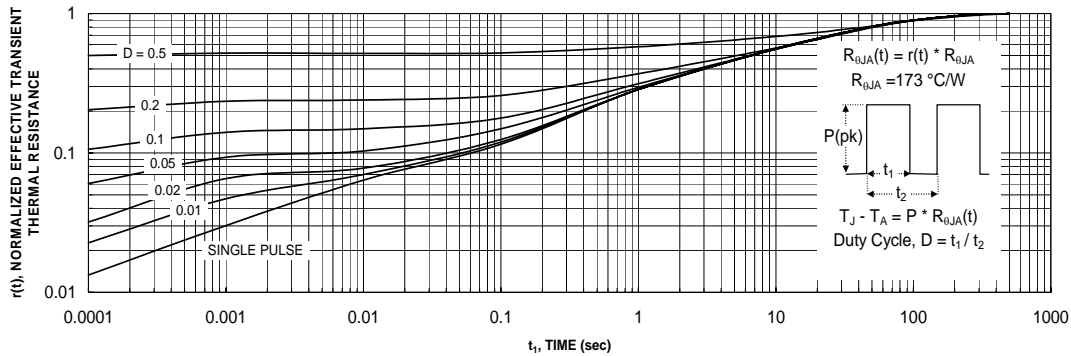
**Figure 8. Capacitance Characteristics.**



**Figure 9. Maximum Safe Operating 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.



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