July 2014

FDMA1029PZ

Dual P-Channel PowerTrench® MOSFET

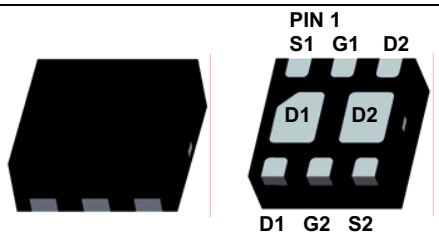
General Description

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.

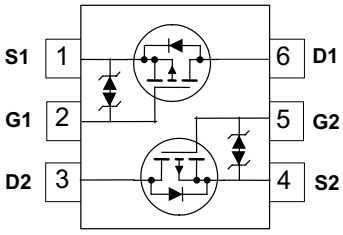
The MicroFET 2x2 package offers exceptional thermal performance for its physical size and is well suited to linear mode applications.

Features

- –3.1 A, –20V. $R_{DS(ON)}$ = 95 mΩ @ V_{GS} = –4.5V
  $R_{DS(ON)}$ = 141 mΩ @ V_{GS} = –2.5V
- Low profile – 0.8 mm maximum – in the new package MicroFET 2x2 mm
- HBM ESD protection level > 2.5kV (Note 3)
- RoHS Compliant
- Free from halogenated compounds and antimony oxides



MicroFET 2x2



Absolute Maximum Ratings

T_A=25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V_{DS}	Drain-Source Voltage		–20	V
V_{GS}	Gate-Source Voltage		±12	V
I_D	Drain Current – Continuous	(Note 1a)	–3.1	A
	– Pulsed		–6	
P_D	Power Dissipation for Single Operation	(Note 1a)	1.4	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, 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	(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

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Electrical Characteristics

T_A = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain–Source Breakdown Voltage	V_{GS} = 0 V, I_D = –250 μA	–20			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = –250 μA, Referenced to 25°C		–12		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = –16 V, V_{GS} = 0 V			–1	μA
I_{GSS}	Gate–Body Leakage	V_{GS} = ± 12 V, V_{DS} = 0 V			±10	μA
On Characteristics (Note 2)						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = –250 μA	–0.6	–1.0	–1.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I_D = –250 μA, Referenced to 25°C		4		mV/°C
$R_{DS(on)}$	Static Drain–Source On–Resistance	V_{GS} = –4.5 V, I_D = –3.1 A V_{GS} = –2.5 V, I_D = –2.5 A V_{GS}= –4.5 V, I_D = –3.1 A, T_J=125°C		60 88 87	95 141 140	mΩ
g_{FS}	Forward Transconductance	V_{DS} = –10 V, I_D = –3.1 A		–11		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = –10 V, V_{GS} = 0 V, f = 1.0 MHz		540		pF
C_{oss}	Output Capacitance			120		pF
C_{rss}	Reverse Transfer Capacitance			100		pF
Switching Characteristics (Note 2)						
$t_{d(on)}$	Turn–On Delay Time	V_{DD} = –10 V, I_D = –1 A, V_{GS} = –4.5 V, R_{GEN} = 6 Ω		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 V, I_D = –3.1 A, V_{GS} = –4.5 V		7.0	10	nC
Q_{gs}	Gate–Source Charge			1.1		nC
Q_{gd}	Gate–Drain Charge			2.4		nC

Drain–Source Diode Characteristics and Maximum Ratings

I_S	Maximum Continuous Source–Drain Diode Forward Current				-1.1	A
V_{SD}	Source–Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = –1.1 A (Note 2)		–0.8	–1.2	V
t_{rr}	Diode Reverse Recovery Time	I_F = –3.1 A, dI_F/dt = 100 A/μs		25		ns
Q_{rr}	Diode Reverse Recovery Charge			9		nC

Notes:

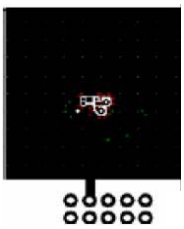
1. $R_{\theta JA}$ is determined with the device mounted on a 1 in^2 oz. copper pad on a 1.5 x 1.5 in. board of FR-4 material. $R_{\theta JC}$ is guaranteed by design while $R_{\theta JA}$ is determined by the user's board design.

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

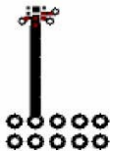
   (b) $R_{\theta JA}$ = 173 °C/W when mounted on a minimum pad of 2 oz copper. For single operation.

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

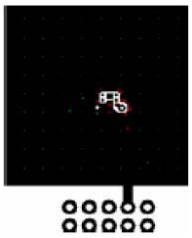
   (d) $R_{\theta JA}$ = 151 °C/W when mounted on a minimum pad of 2 oz copper. For dual operation.



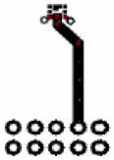
a)86 °C/W when mounted on a 1 in^2 pad of 2 oz copper.



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



c)69 °C/W when mounted on a 1 in^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 < 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

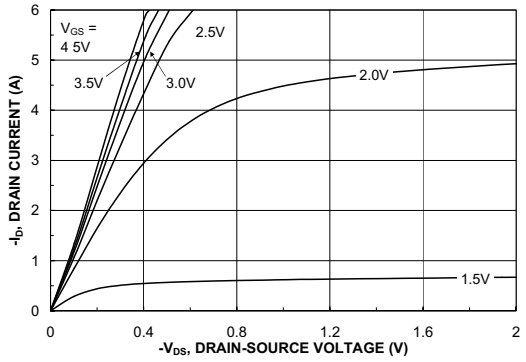


Figure 1. On-Region Characteristics.

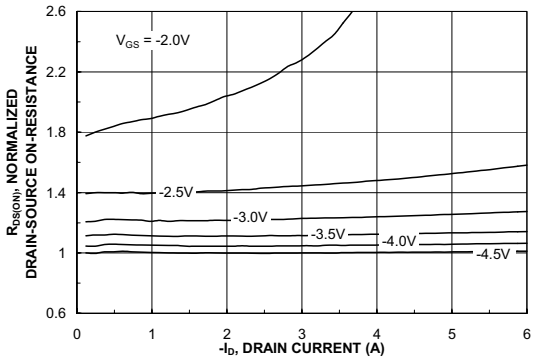


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

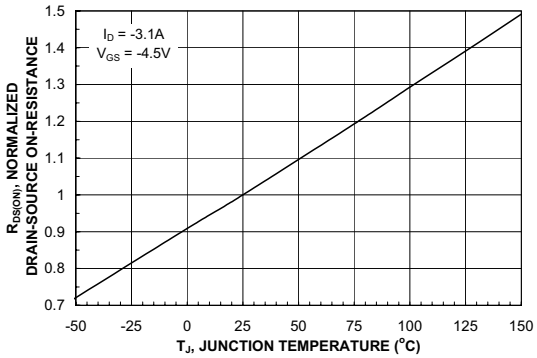


Figure 3. On-Resistance Variation with Temperature.

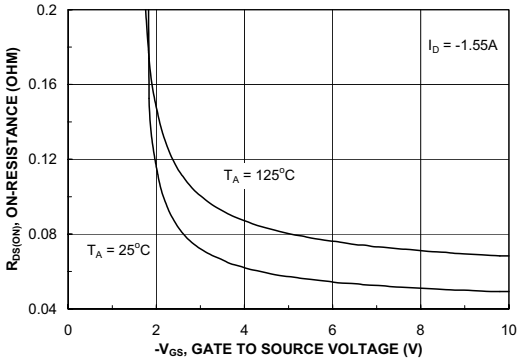


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

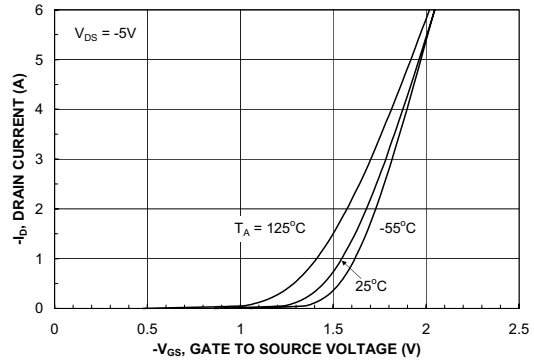


Figure 5. Transfer Characteristics.

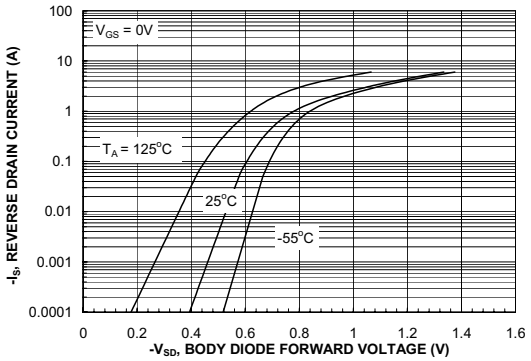


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics

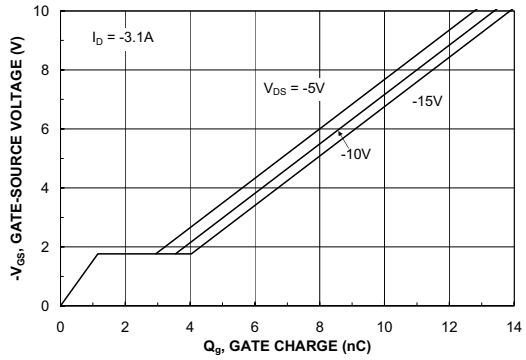


Figure 7. Gate Charge Characteristics.

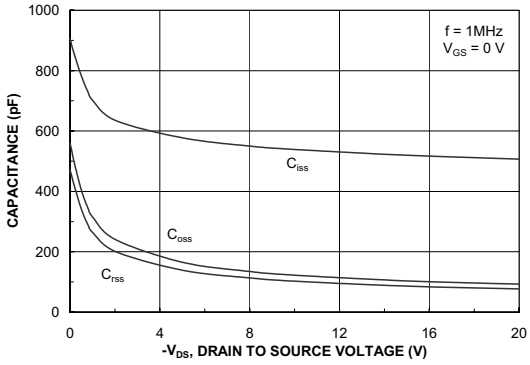


Figure 8. Capacitance Characteristics.

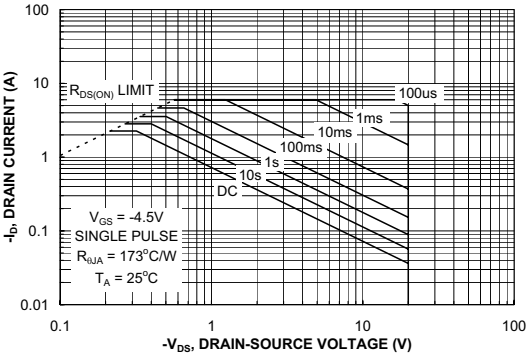


Figure 9. Maximum Safe Operating Area.

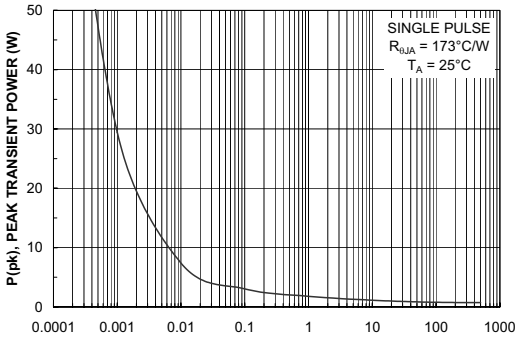


Figure 10. Single Pulse Maximum Power Dissipation.

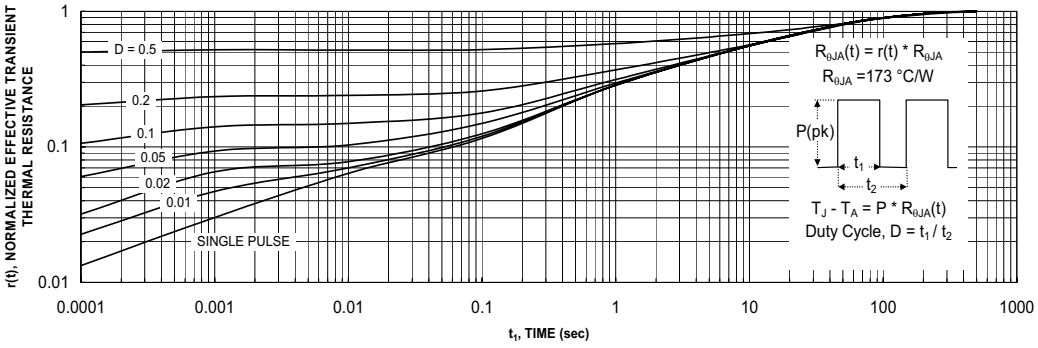
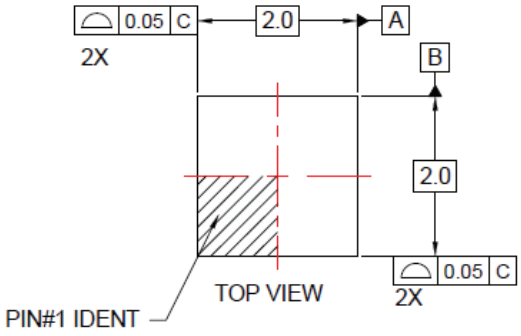
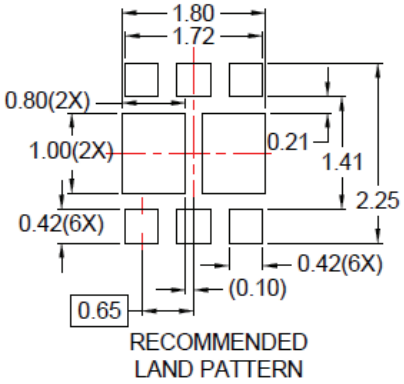


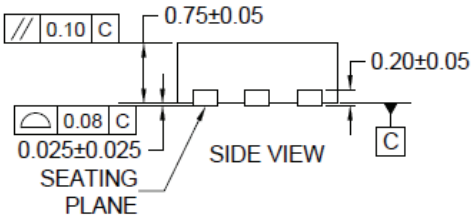
Figure 11. Transient Thermal Response Curve.

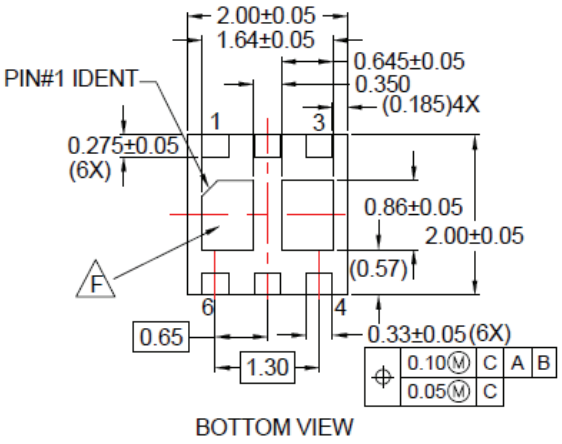
Thermal characterization performed using the conditions described in Note 1b.
Transient thermal response will change depending on the circuit board design.

Dimensional Outline and Pad Layout









NOTES:

A. CONFORM TO JADEC REGISTRATIONS MO-229, VARIATION VCCC, EXCEPT WHERE NOTED.

B. DIMENSIONS ARE IN MILLIMETERS.

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

D. LAND PATTERN RECOMMENDATION IS EXISTING INDUSTRY LAND PATTERN.

E. DRAWING FILENAME: MKT-UMLP16Erev4

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