

FDMA1027PT

Dual P-Channel PowerTrench® MOSFET

-20 V, -3 A, 120 mΩ

Features

- Max $r_{DS(on)}$ = 120 mΩ at $V_{GS} = -4.5$ V, $I_D = -3.0$ A
- Max $r_{DS(on)}$ = 160 mΩ at $V_{GS} = -2.5$ V, $I_D = -2.5$ A
- Max $r_{DS(on)}$ = 240 mΩ at $V_{GS} = -1.8$ V, $I_D = -1.0$ A
- Low profile - 0.55 mm maximum - in the new package MicroFET 2x2 Thin
- RoHS Compliant



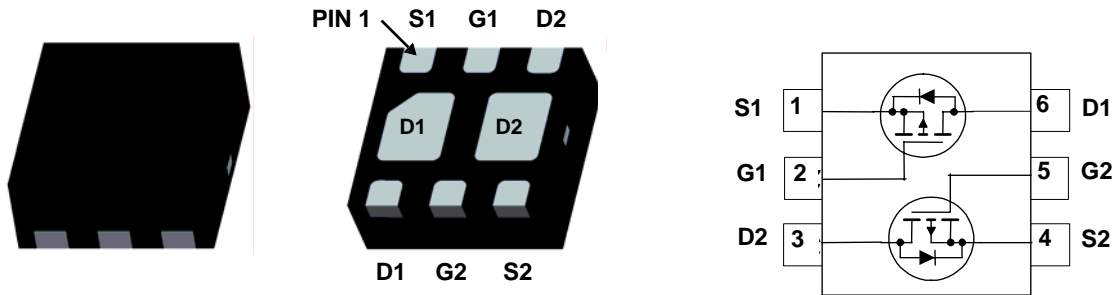
General Description

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 Thin package offers exceptional thermal performance for its physical size and is well suited to linear mode applications.

Applications

- Battery management
- Load switch
- Battery protection



MicroFET 2X2 Thin

MOSFET Maximum Ratings $T_A = 25$ °C unless otherwise noted

Symbol	Parameter	Rated	Units
V_{DS}	Drain to Source Voltage	-20	V
V_{GS}	Gate to Source Voltage	±8	V
I_D	Drain Current -Continuous $T_A = 25$ °C (Note 1a)	-3	A
	-Pulsed	-6	
P_D	Power Dissipation for Single Operation $T_A = 25$ °C (Note 1a)	1.4	W
	Power Dissipation for Single Operation $T_A = 25$ °C (Note 1b)	0.7	
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	°C

Thermal Characteristics

Symbol	Parameter	Rated	Units
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Single Operation) (Note 1a)	86	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Single Operation) (Note 1b)	173	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Dual Operation)	69	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Dual Operation)	151	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
27	FDMA1027PT	MicroFET 2x2 Thin	7"	8 mm	3000 units

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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Off Characteristics

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

On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = -250\text{ }\mu\text{A}$	-0.4	-0.7	-1.3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = -250\text{ }\mu\text{A}$, referenced to $25\text{ }^\circ\text{C}$		2		mV/ $^\circ\text{C}$
$r_{DS(on)}$	Drain to Source On Resistance	$V_{GS} = -4.5\text{ V}, I_D = -3.0\text{ A}$		90	120	m Ω
		$V_{GS} = -2.5\text{ V}, I_D = -2.5\text{ A}$		120	160	
		$V_{GS} = -1.8\text{ V}, I_D = -1.0\text{ A}$		172	240	
		$V_{GS} = -4.5\text{ V}, I_D = -3.0\text{ A}, T_J = 125\text{ }^\circ\text{C}$		118	160	
$I_{D(on)}$	On to State Drain Current	$V_{GS} = -4.5\text{ V}, V_{DS} = -5\text{ V}$	-20			A
g_{FS}	Forward Transconductance	$V_{DS} = -5\text{ V}, I_D = -3.0\text{ A}$		7		S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		435		pF
C_{oss}	Output Capacitance			80		pF
C_{rss}	Reverse Transfer Capacitance			45		pF

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = -10\text{ V}, I_D = -1.0\text{ A}, V_{GS} = -4.5\text{ V}, R_{GEN} = 6\text{ }\Omega$		9	18	ns
t_r	Rise Time			11	19	ns
$t_{d(off)}$	Turn-Off Delay Time			15	27	ns
t_f	Fall Time			6	12	ns
Q_g	Total Gate Charge	$V_{DD} = -10\text{ V}, I_D = -3.0\text{ A}, V_{GS} = -4.5\text{ V}$		4	6	nC
Q_{gs}	Gate to Source Gate Charge			0.8		nC
Q_{gd}	Gate to Drain "Miller" Charge			0.9		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	$V_{GS} = 0\text{ V}, I_S = -1.1\text{ A}$ (Note 2)	-0.8	-1.2	V
t_{rr}	Reverse Recovery Time	$I_F = -3.0\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		17	ns
Q_{rr}	Reverse Recovery Charge			6	nC

Notes:

- $R_{\theta JA}$ is determined with the device mounted on a 1 in² pad 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 $R_{\theta CA}$ is determined by the user's board design.



a. 86 $^\circ\text{C}/\text{W}$ when mounted on a 1 in² pad of 2 oz copper.



b. 173 $^\circ\text{C}/\text{W}$ when mounted on a minimum pad of 2 oz copper.

- Pulse Test: Pulse Width < 300 μs , Duty cycle < 2.0%.

Typical Characteristics $T_J = 25\text{ }^\circ\text{C}$ unless otherwise noted

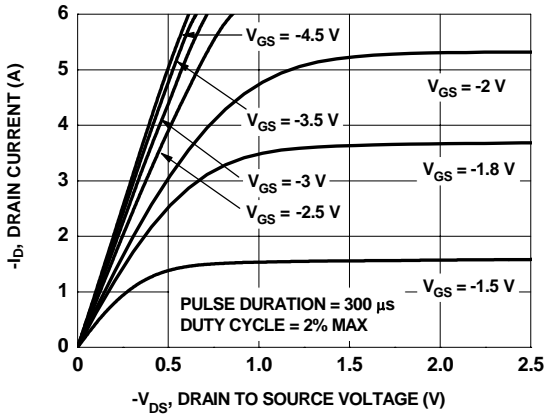


Figure 1. On Region Characteristics

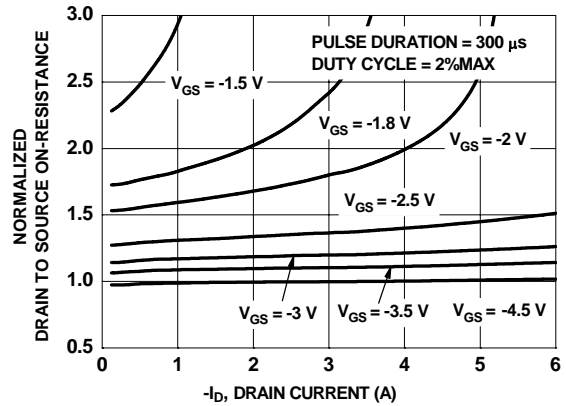


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

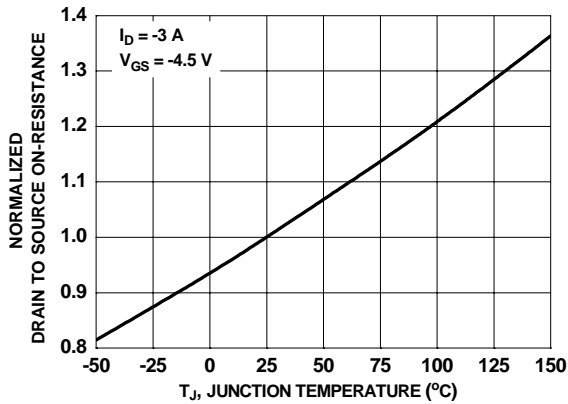


Figure 3. Normalized On Resistance vs Junction Temperature

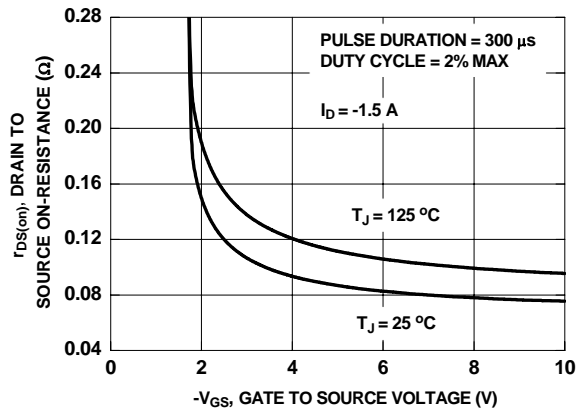


Figure 4. On-Resistance vs Gate to Source Voltage

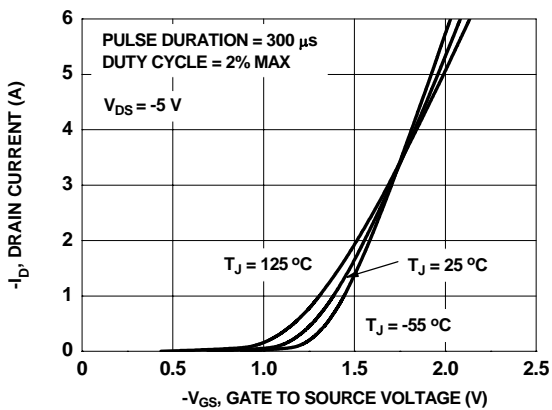


Figure 5. Transfer Characteristics

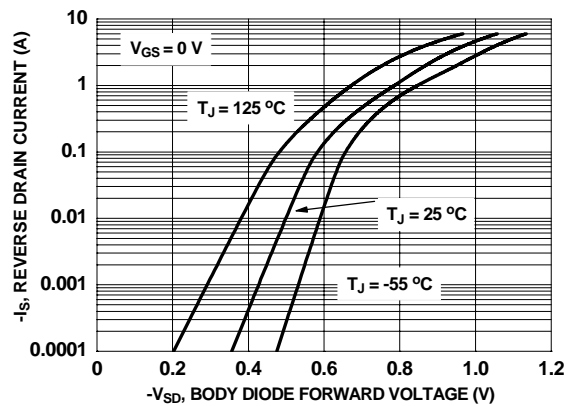


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics $T_J = 25\text{ }^\circ\text{C}$ unless otherwise noted

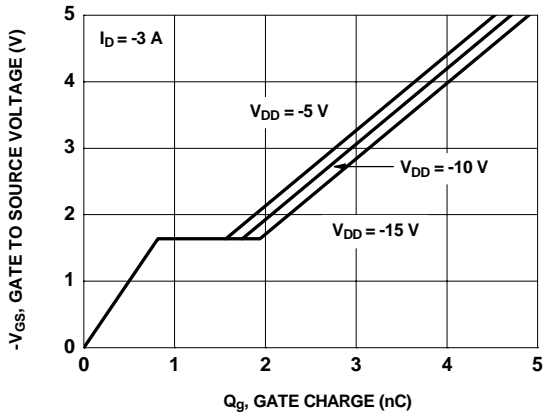


Figure 7. Gate Charge Characteristics

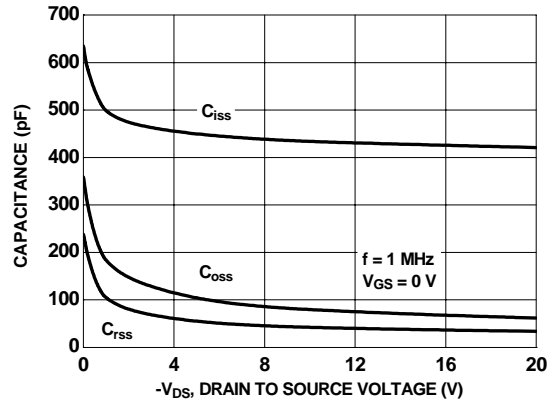


Figure 8. Capacitance vs Drain to Source Voltage

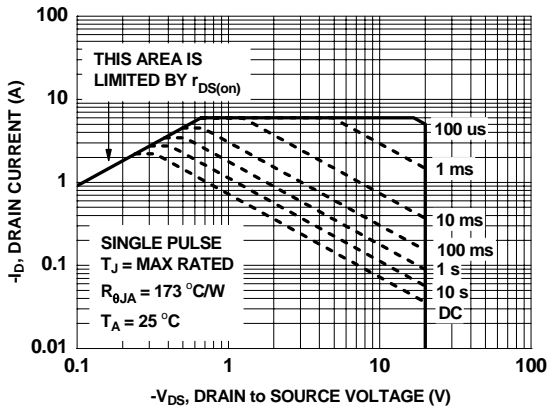


Figure 9. Forward Bias Safe Operating Area

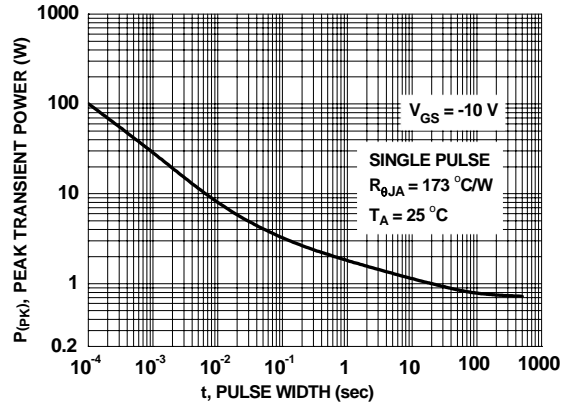


Figure 10. Single Pulse Maximum Power Dissipation

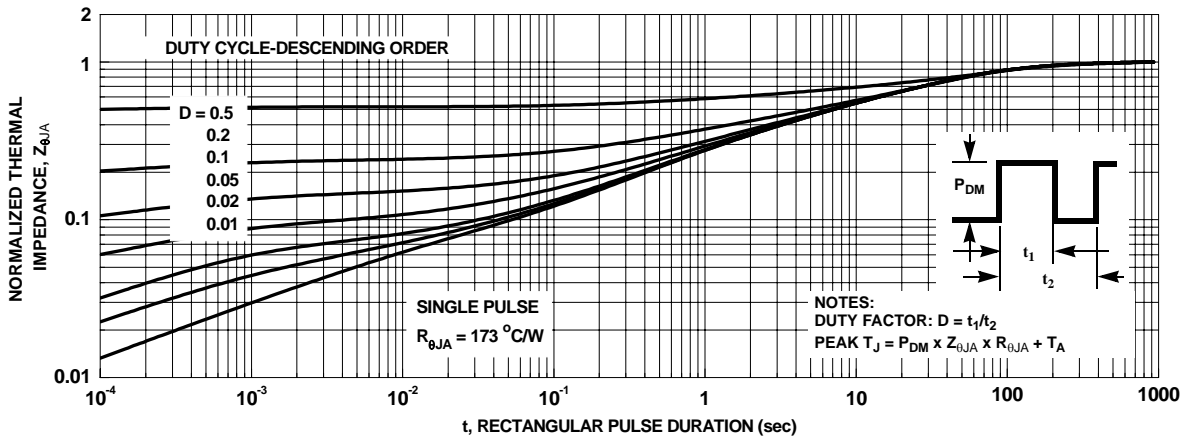
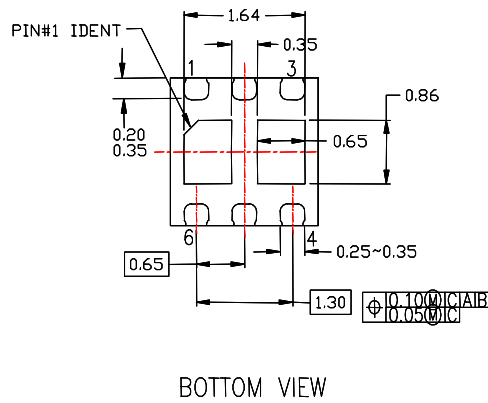
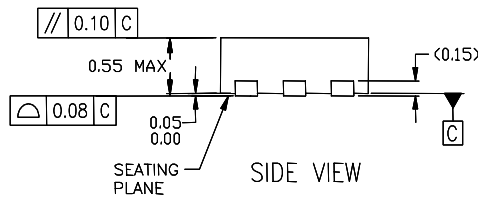
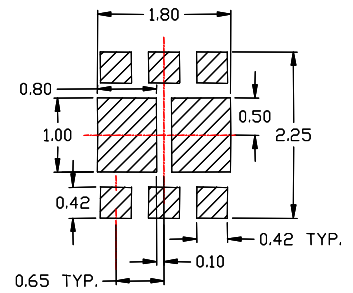
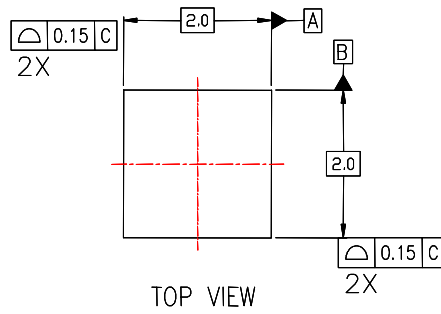


Figure 11. Junction-to-Ambient Transient Thermal Response Curve

Dimensional Outline and Pad Layout







NOTES:

- A. NON CONFORMS TO JEDEC REGISTRATION MO-288,
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994



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