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# FDME1023PZT

## Dual P-Channel PowerTrench® MOSFET

### -20 V, -2.6 A, 142 mΩ

#### Features

- Max  $r_{DS(on)}$  = 142 mΩ at  $V_{GS} = -4.5$  V,  $I_D = -2.3$  A
- Max  $r_{DS(on)}$  = 213 mΩ at  $V_{GS} = -2.5$  V,  $I_D = -1.8$  A
- Max  $r_{DS(on)}$  = 331 mΩ at  $V_{GS} = -1.8$  V,  $I_D = -1.5$  A
- Max  $r_{DS(on)}$  = 530 mΩ at  $V_{GS} = -1.5$  V,  $I_D = -1.2$  A
- Low profile: 0.55 mm maximum in the new package MicroFET 1.6x1.6 **Thin**
- Free from halogenated compounds and antimony oxides
- HBM ESD protection level > 1600 V (Note 3)
- RoHS Compliant



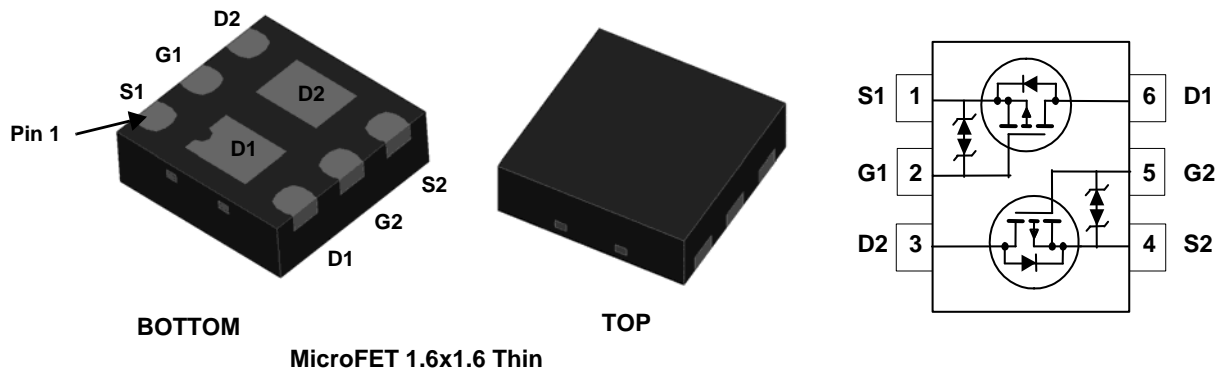
#### General Description

This device is designed specifically as a single package solution for the battery charges 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 1.6x1.6 **Thin** package offers exceptional thermal performance for its physical size and is well suited to switching and linear mode applications.

#### Applications

- Load Switch
- Battery Charging
- Battery Disconnect Switch



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

Symbol	Parameter	Ratings	Units
$V_{DS}$	Drain to Source Voltage	-20	V
$V_{GS}$	Gate to Source Voltage	±8	V
$I_D$	Drain Current -Continuous $T_A = 25^\circ\text{C}$ (Note 1a)	-2.6	A
	-Pulsed	-6	
$P_D$	Power Dissipation for Single Operation $T_A = 25^\circ\text{C}$ (Note 1a)	1.4	W
	Power Dissipation for Single Operation $T_A = 25^\circ\text{C}$ (Note 1b)	0.6	
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ\text{C}$

#### Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Single Operation) (Note 1a)	90	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Single Operation) (Note 1b)	195	

#### Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
2T	FDME1023PZT	MicroFET 1.6x1.6 <b>Thin</b>	7"	8 mm	5000 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	$\mu\text{A}$
$I_{GSS}$	Gate to Source Leakage Current	$V_{GS} = \pm 8\text{ V}$ , $V_{DS} = 0\text{ V}$			$\pm 10$	$\mu\text{A}$

### On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$ , $I_D = -250\text{ }\mu\text{A}$	-0.4	-0.6	-1.0	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	$V_{GS} = -4.5\text{ V}$ , $I_D = -2.3\text{ A}$		95	142	m $\Omega$
		$V_{GS} = -2.5\text{ V}$ , $I_D = -1.8\text{ A}$		120	213	
		$V_{GS} = -1.8\text{ V}$ , $I_D = -1.5\text{ A}$		150	331	
		$V_{GS} = -1.5\text{ V}$ , $I_D = -1.2\text{ A}$		190	530	
		$V_{GS} = -4.5\text{ V}$ , $I_D = -2.3\text{ A}$ , $T_J = 125\text{ }^\circ\text{C}$		128	190	
$g_{FS}$	Forward Transconductance	$V_{DS} = -4.5\text{ V}$ , $I_D = -2.3\text{ A}$		7		S

### Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = -10\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1\text{ MHz}$		305	405	pF
$C_{oss}$	Output Capacitance			55	75	pF
$C_{rss}$	Reverse Transfer Capacitance			50	75	pF

### Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = -10\text{ V}$ , $I_D = -1\text{ A}$ , $V_{GS} = -4.5\text{ V}$ , $R_{GEN} = 6\text{ }\Omega$		4.7	10	ns
$t_r$	Rise Time			4.8	10	ns
$t_{d(off)}$	Turn-Off Delay Time			33	53	ns
$t_f$	Fall Time			16	29	ns
$Q_g$	Total Gate Charge		$V_{DD} = -10\text{ V}$ , $I_D = -2.3\text{ A}$ , $V_{GS} = -4.5\text{ V}$		5.5	7.7
$Q_{gs}$	Gate to Source Gate Charge			0.6		nC
$Q_{gd}$	Gate to Drain "Miller" Charge			1.4		nC

### Drain-Source Diode Characteristics

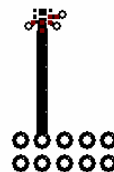
$V_{SD}$	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{ V}$ , $I_S = -0.9\text{ A}$ (Note 2)		-0.8	-1.2	V
$t_{rr}$	Reverse Recovery Time	$I_F = -2.3\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$		16	29	ns
$Q_{rr}$	Reverse Recovery Charge			4.4	10	nC

#### NOTES:

1.  $R_{\theta JA}$  is determined with the device mounted on a 1 in<sup>2</sup> 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.  $90\text{ }^\circ\text{C}/\text{W}$  when mounted on a 1 in<sup>2</sup> pad of 2 oz copper.

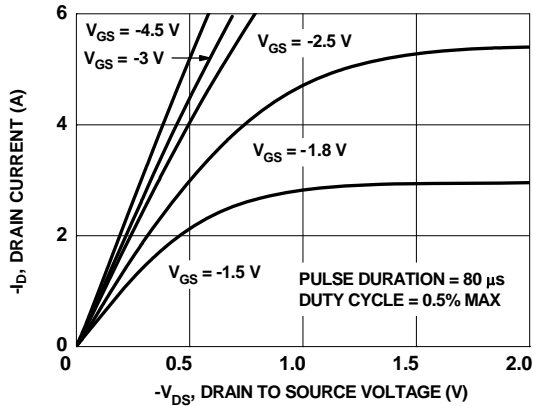


b.  $195\text{ }^\circ\text{C}/\text{W}$  when mounted on a minimum pad of 2 oz copper.

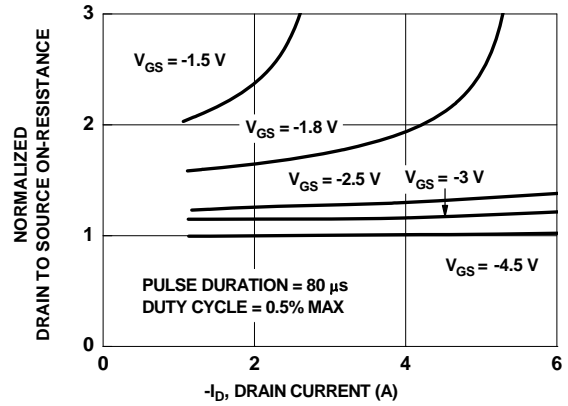
2. Pulse Test: Pulse Width < 300  $\mu\text{s}$ , Duty cycle < 2.0%.

3. The diode connected between the gate and source serves only as protection ESD. No gate overvoltage rating is implied.

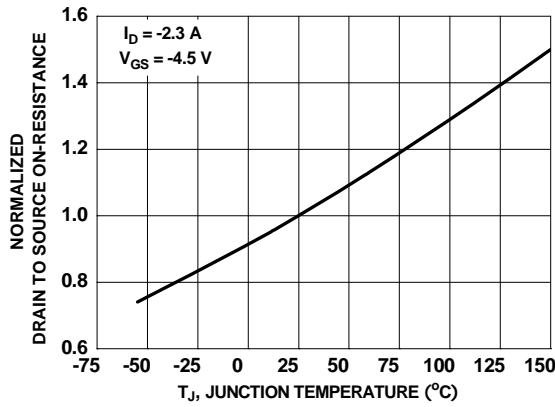
**Typical Characteristics**  $T_J = 25\text{ }^\circ\text{C}$  unless otherwise noted



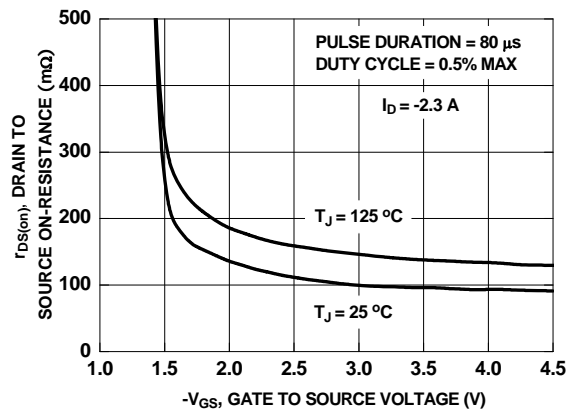
**Figure 1. On Region Characteristics**



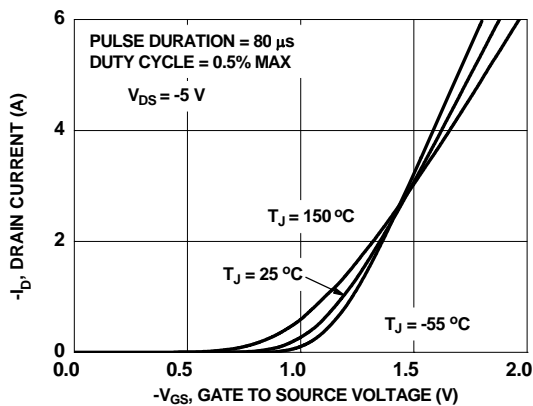
**Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage**



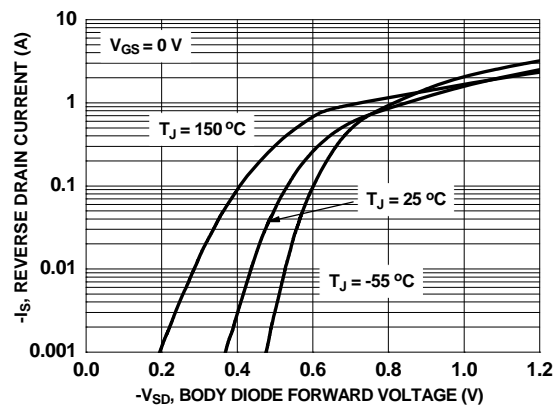
**Figure 3. Normalized On Resistance vs Junction Temperature**



**Figure 4. On-Resistance vs Gate to Source Voltage**

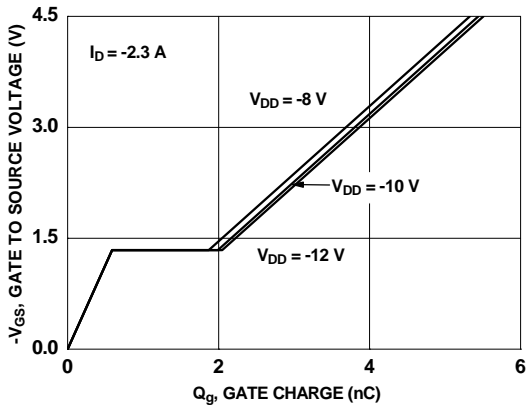


**Figure 5. Transfer Characteristics**

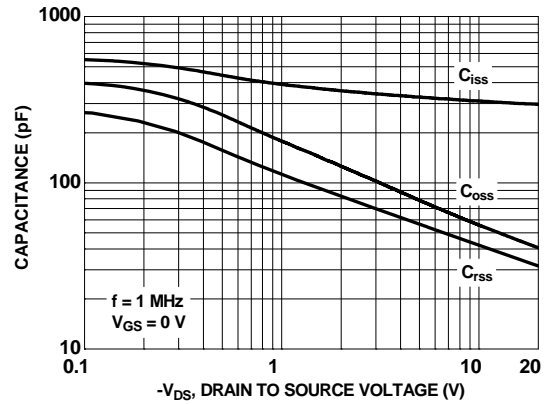


**Figure 6. Source to Drain Diode Forward Voltage vs Source Current**

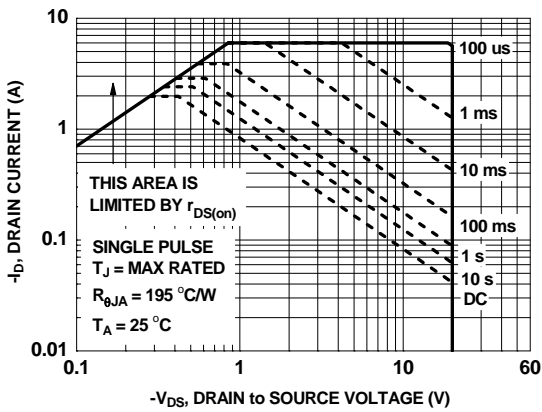
**Typical Characteristics**  $T_J = 25\text{ }^\circ\text{C}$  unless otherwise noted



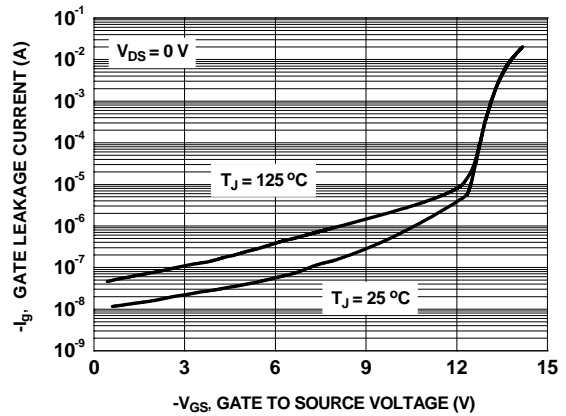
**Figure 7. Gate Charge Characteristics**



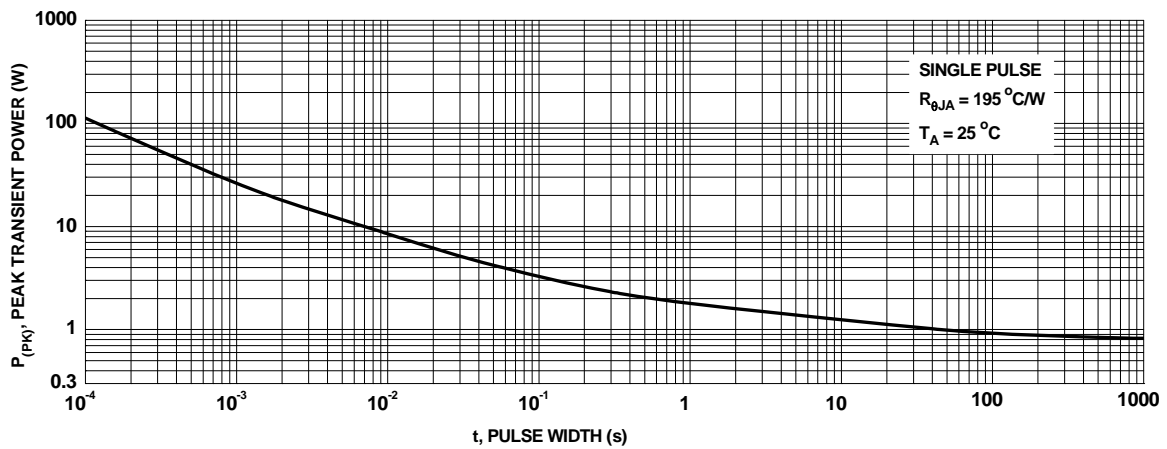
**Figure 8. Capacitance vs Drain to Source Voltage**



**Figure 9. Forward Bias Safe Operating Area**

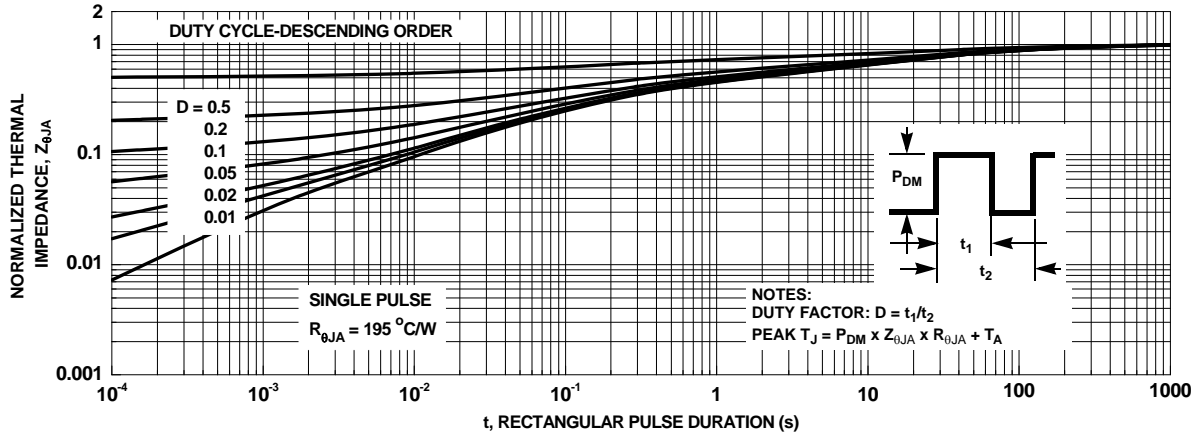


**Figure 10. Gate Leakage Current vs Gate to Source Voltage**



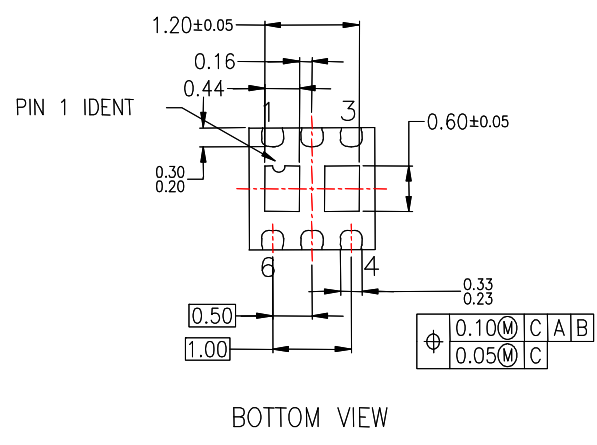
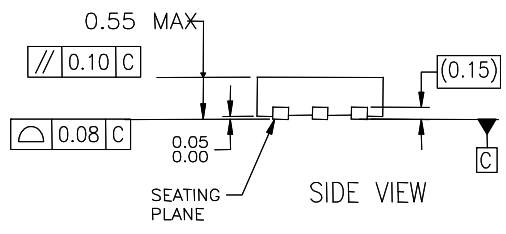
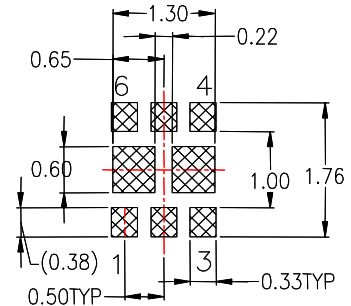
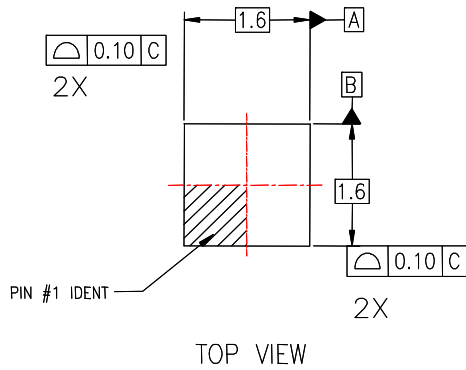
**Figure 11. Single Pulse Maximum Power Dissipation**

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



**Figure 12. Junction-to-Ambient Transient Thermal Response Curve**

## Dimensional Outline and Pad Layout





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