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May 2010



## FDMA507PZ

### Single P-Channel PowerTrench® MOSFET

-20 V, -7.8 A, 24 mΩ

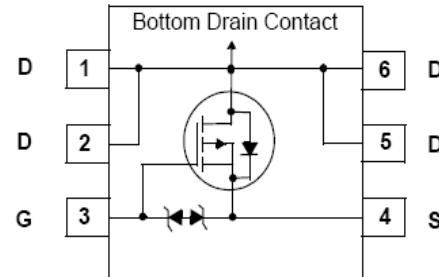
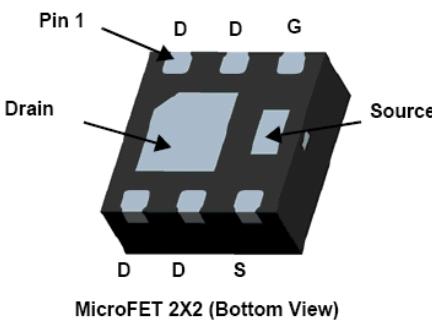
#### Features

- Max  $r_{DS(on)}$  = 24 mΩ at  $V_{GS} = -5$  V,  $I_D = -7.8$  A
- Max  $r_{DS(on)}$  = 25 mΩ at  $V_{GS} = -4.5$  V,  $I_D = -7$  A
- Max  $r_{DS(on)}$  = 35 mΩ at  $V_{GS} = -2.5$  V,  $I_D = -5.5$  A
- Max  $r_{DS(on)}$  = 45 mΩ at  $V_{GS} = -1.8$  V,  $I_D = -4$  A
- Low Profile - 0.8 mm maximum - in the package MicroFET 2X2 mm
- HBM ESD protection level > 3.2K V typical (Note3)
- Free from halogenated compounds and antimony oxides
- RoHS Compliant

#### General Description

This device is designed specifically for battery charge or load switching in cellular handset and other ultraportable applications. It features a MOSFET with low on-state resistance.

The MicroFET 2X2 package offers exceptional thermal performance for its physical size and is well suited to linear mode applications.



MicroFET 2X2 (Bottom View)

#### MOSFET Maximum Ratings $T_A = 25$ °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 $T_A = 25$ °C (Note 1a)	-7.8	A
	-Pulsed	-24	
$P_D$	Power Dissipation $T_A = 25$ °C (Note 1a)	2.4	W
	Power Dissipation $T_A = 25$ °C (Note 1b)	0.9	
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +150	°C

#### Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	52	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1b)	145	

#### Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
507	FDMA507PZ	MicroFET 2X2	7 "	12 mm	3000 units

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
<b>Off Characteristics</b>						
$BV_{DSS}$	Drain to Source Breakdown Voltage	$I_D = -250 \mu\text{A}$ , $V_{GS} = 0 \text{ V}$	-20			V
$\frac{\Delta BVDSS}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = -250 \mu\text{A}$ , referenced to $25^\circ\text{C}$		-12		$\text{mV/}^\circ\text{C}$
$I_{DSS}$	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	$V_{GS} = V_{DS}$ , $I_D = -250 \mu\text{A}$	-0.4	-0.5	-1.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = -250 \mu\text{A}$ , referenced to $25^\circ\text{C}$		3		$\text{mV/}^\circ\text{C}$
$r_{DS(on)}$	Drain to Source On Resistance	$V_{GS} = -5 \text{ V}$ , $I_D = -7.8 \text{ A}$		19	24	$\text{m}\Omega$
		$V_{GS} = -4.5 \text{ V}$ , $I_D = -7 \text{ A}$		20	25	
		$V_{GS} = -2.5 \text{ V}$ , $I_D = -5.5 \text{ A}$		24	35	
		$V_{GS} = -1.8 \text{ V}$ , $I_D = -4 \text{ A}$		29	45	
		$V_{GS} = -5 \text{ V}$ , $I_D = -7.8 \text{ A}$ , $T_J = 125^\circ\text{C}$		26	34	
$g_{FS}$	Forward Transconductance	$V_{DS} = -5 \text{ V}$ , $I_D = -7.8 \text{ A}$		33		S

## Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = -10 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $f = 1 \text{ MHz}$		1515	2015	pF
$C_{oss}$	Output Capacitance			265	355	pF
$C_{rss}$	Reverse Transfer Capacitance			240	360	pF

## Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = -10 \text{ V}$ , $I_D = -7.8 \text{ A}$ $V_{GS} = -5 \text{ V}$ , $R_{GEN} = 6 \Omega$		6.4	13	ns
$t_r$	Rise Time			14	25	ns
$t_{d(off)}$	Turn-Off Delay Time			192	307	ns
$t_f$	Fall Time			96	154	ns
$Q_{g(TOT)}$	Total Gate Charge	$V_{DD} = -10 \text{ V}$ , $I_D = -7.8 \text{ A}$ $V_{GS} = -5 \text{ V}$		30	42	nC
$Q_{gs}$	Gate to Source Gate Charge			2		nC
$Q_{gd}$	Gate to Drain "Miller" Charge			7.5		nC

## Drain-Source Diode Characteristics

$V_{SD}$	Source to Drain Diode Forward Voltage	$V_{GS} = 0 \text{ V}$ , $I_S = -2.0 \text{ A}$ (Note 2)		-0.6	-1.2	V
$t_{rr}$	Reverse Recovery Time	$I_F = -7.8 \text{ A}$ , $di/dt = 100 \text{ A}/\mu\text{s}$		66	106	ns
$Q_{rr}$	Reverse Recovery Charge				44	70

**Notes:**

1.  $R_{JIA}$  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.  $R_{JJC}$  is guaranteed by design while  $R_{JCA}$  is determined by the user's board design.



a. 52 °C/W when mounted on a 1 in<sup>2</sup> pad of 2 oz copper.



b. 145 °C/W when mounted on a minimum pad of 2 oz copper.

2. Pulse Test: Pulse Width < 300μs, 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**  $T_J = 25^\circ\text{C}$  unless otherwise noted

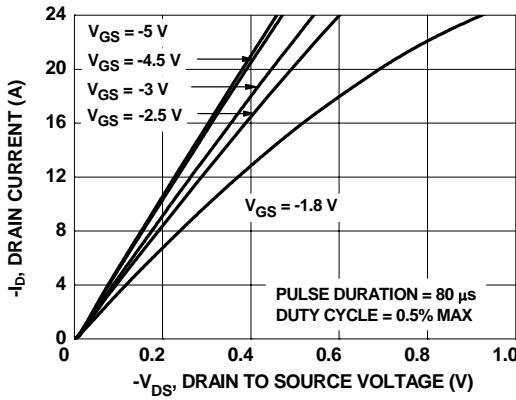


Figure 1. On Region Characteristics

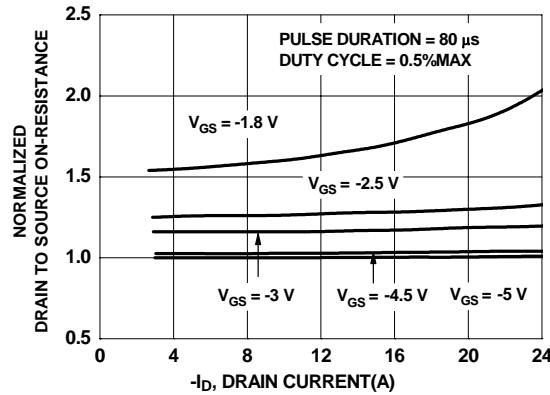


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

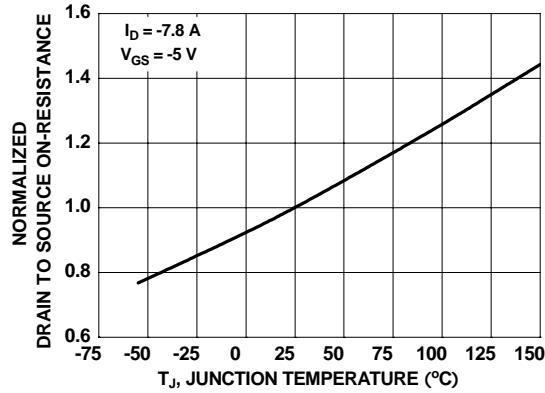


Figure 3. Normalized On Resistance vs Junction Temperature

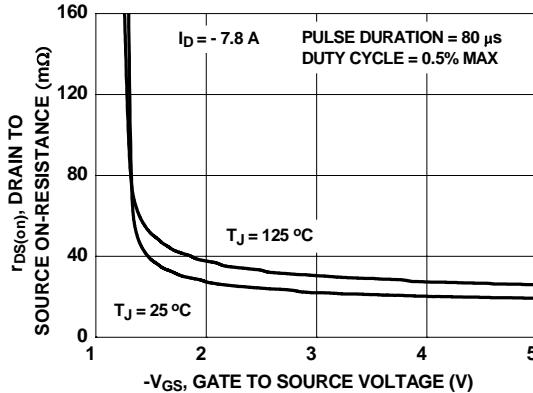


Figure 4. On-Resistance vs Gate to Source Voltage

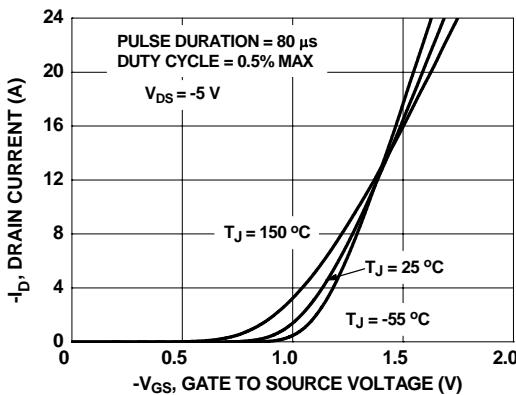


Figure 5. Transfer Characteristics

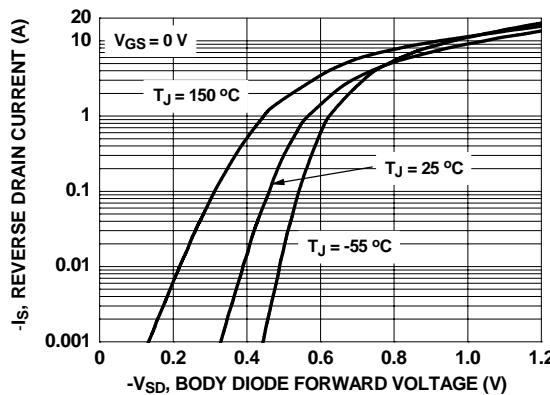


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

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

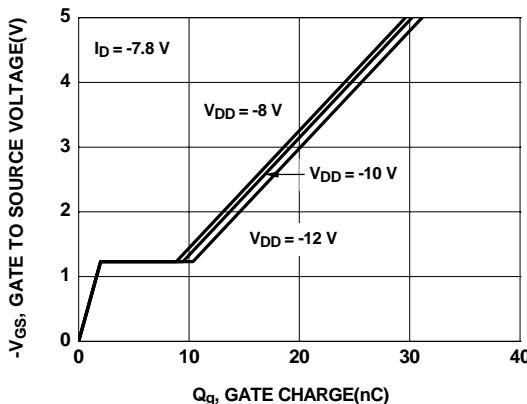


Figure 7. Gate Charge Characteristics

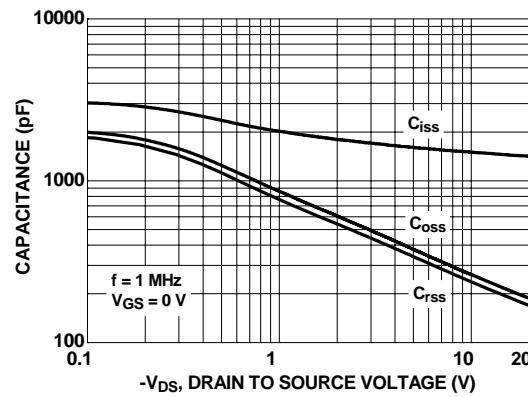


Figure 8. Capacitance vs Drain to Source Voltage

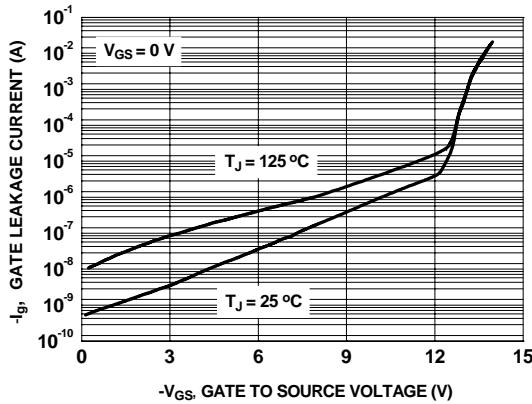


Figure 9. Gate Leakage Current vs Gate to Source Voltage

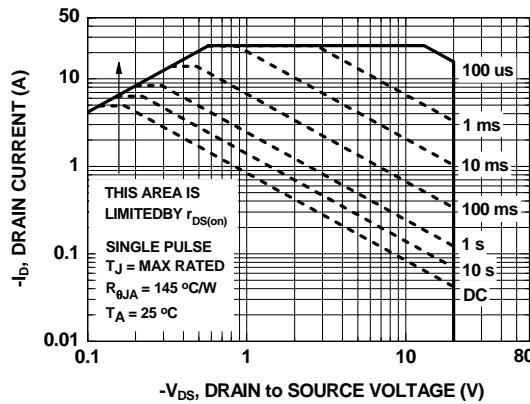


Figure 10. Forward Bias Safe Operating Area

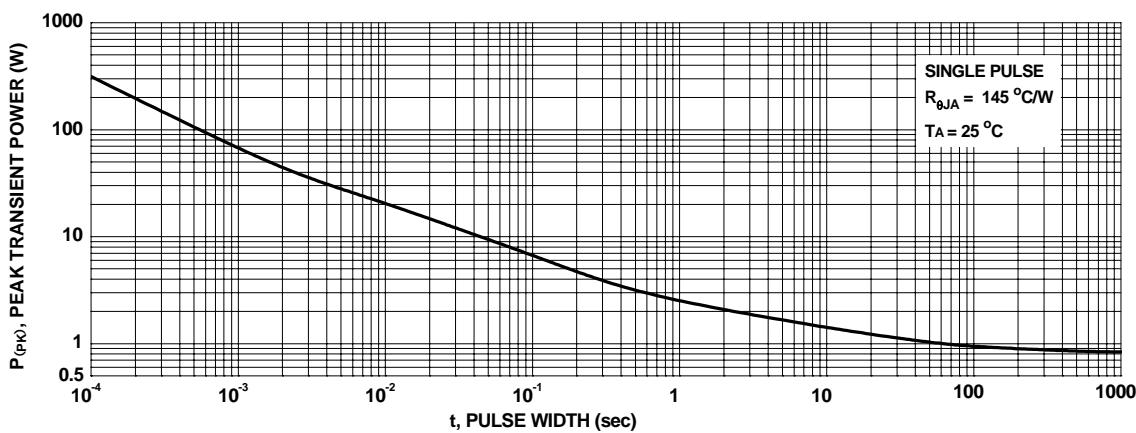


Figure 11. Single Pulse Maximum Power Dissipation

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

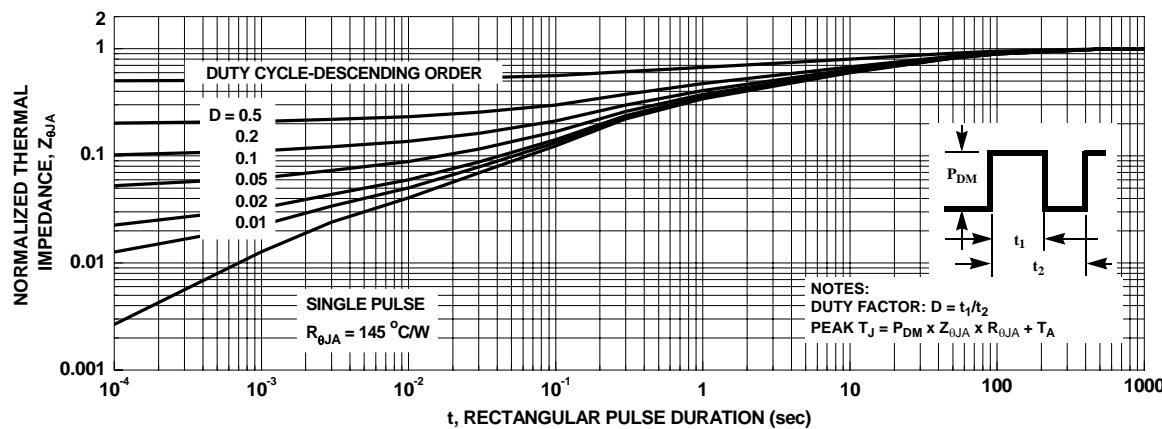
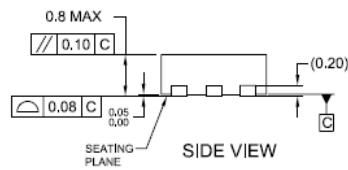
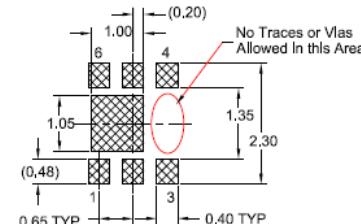
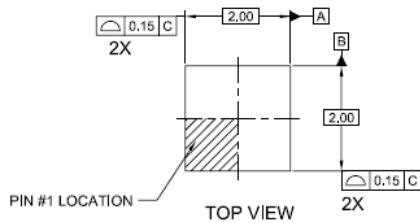
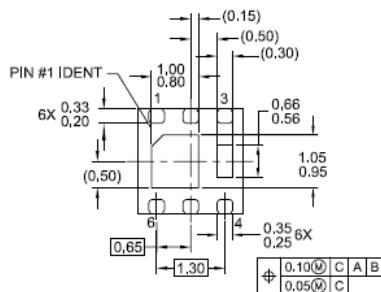


Figure 12. Junction-to-Ambient Transient Thermal Response Curve

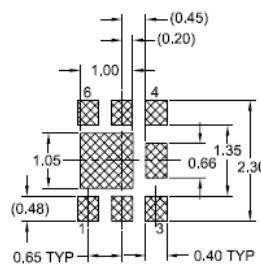
### Dimensional Outline and Pad Layout



RECOMMENDED LAND PATTERN OPT 1



BOTTOM VIEW



RECOMMENDED LAND PATTERN OPT 2

#### NOTES:

- A. DOES NOT FULLY CONFORM TO JEDEC REGISTRATION  
MO-229 DATED AUG/2003
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS AND TOLERANCES PER  
ASME Y14.5M, 1994



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