

# MOSFET – Dual, P-Channel, POWERTRENCH®

30 V, -29 A, 90 mΩ

## FDMA3023PZ

### 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.

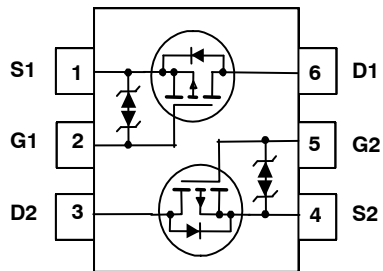
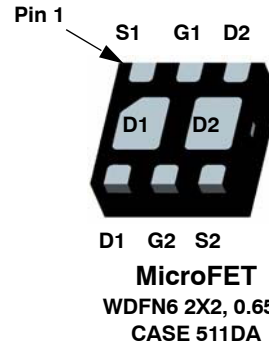
### Features

- Max  $R_{DS(on)}$  = 90 mΩ at  $V_{GS} = -4.5$  V,  $I_D = -2.9$  A
- Max  $R_{DS(on)}$  = 130 mΩ at  $V_{GS} = -2.5$  V,  $I_D = -2.6$  A
- Max  $R_{DS(on)}$  = 170 mΩ at  $V_{GS} = -1.8$  V,  $I_D = -1.7$  A
- Max  $R_{DS(on)}$  = 240 mΩ at  $V_{GS} = -1.5$  V,  $I_D = -1.0$  A
- Low Profile – 0.8 mm Maximum – in the New Package MicroFET™ 2x2 mm
- HBM ESD Protection > 2 kV (Note 3)
- These Devices is Pb-Free, Halide Free and is RoHS Compliant
- Free From Halogenated Compounds and Antimony Oxides

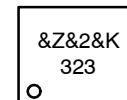
### ABSOLUTE MAXIMUM RATINGS $T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain to Source Voltage	-30	V
$V_{GS}$	Gate to Source Voltage	±8	V
$I_D$	Drain Current		A
	- Continuous (Note 1a)	-2.9	
	- Pulsed	-6	
$P_D$	Power Dissipation $T_A = 25^\circ\text{C}$ (Note 1a)	1.4	W
	Power Dissipation $T_A = 25^\circ\text{C}$ (Note 1b)	0.7	
$T_J, T_{stg}$	Operating and Storage Junction Temperature Range	-55 to +150	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.



### MARKING DIAGRAM



- &Z = Assembly Plant Code
- &2 = 2-Digit Date-Code
- &K = 2-Digit Lot Code
- 323 = Specific Device Code

### ORDERING INFORMATION

Device	Package	Shipping†
FDMA3023PZ	WDFN-6 (Pb-Free)	3000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, [BRD8011/D](#).

# FDMA3023PZ

## THERMAL CHARACTERISTICS

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

## ELECTRICAL CHARACTERISTICS $T_J = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
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### Off Characteristics

$BV_{DSS}$	Drain to Source Breakdown Voltage	$I_D = -250 \mu\text{A}, V_{GS} = 0 \text{ V}$	-30	-	-	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = -250 \mu\text{A}$ , Referenced to $25^\circ\text{C}$	-	-24	-	mV/°C
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = -24 \text{ V}, V_{GS} = 0 \text{ V}$	-	-	-1	$\mu\text{A}$
$I_{GSS}$	Gate to Source Leakage Current	$V_{GS} = \pm 8 \text{ V}, V_{DS} = 0 \text{ V}$	-	-	$\pm 100$	nA

### On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = -250 \mu\text{A}$	-0.4	-0.6	-1.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = -250 \mu\text{A}$ , Referenced to $25^\circ\text{C}$	-	3	-	mV/°C
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = -4.5 \text{ V}, I_D = -2.9 \text{ A}$ $V_{GS} = -2.5 \text{ V}, I_D = -2.6 \text{ A}$ $V_{GS} = -1.8 \text{ V}, I_D = -1.7 \text{ A}$ $V_{GS} = -1.5 \text{ V}, I_D = -1.0 \text{ A}$ $V_{GS} = -4.5 \text{ V}, I_D = -2.9 \text{ A}, T_J = 125^\circ\text{C}$	-	71 97 122 151 110	90 130 170 240 140	m $\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS} = -5 \text{ V}, I_D = -2.9 \text{ A}$	-	10	-	S

### Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = -15 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	-	400	530	pF
$C_{oss}$	Output Capacitance		-	55	70	pF
$C_{rss}$	Reverse Transfer Capacitance		-	45	65	pF

### Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = -15 \text{ V}, I_D = -1.0 \text{ A},$ $V_{GS} = -4.5 \text{ V}, R_{GEN} = 6 \Omega$	-	5	10	ns
$t_r$	Rise Time		-	4	10	ns
$t_{d(off)}$	Turn-Off Delay Time		-	62	100	ns
$t_f$	Fall Time		-	18	33	ns
$Q_{gTOT}$	Total Gate Charge	$V_{DD} = -15 \text{ V}, I_D = -2.9 \text{ A},$ $V_{GS} = -4.5 \text{ V}$	-	7.9	11	nC
$Q_{gs}$	Gate to Source Gate Charge		-	0.9	-	nC
$Q_{gd}$	Gate to Drain "Miller" Charge		-	1.9	-	nC

### Drain-Source Diode Characteristics and Maximum Ratings

$I_S$	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	$I_F = -2.9 \text{ A}, di/dt = 100 \text{ A}/\mu\text{s}$	-	18	33	ns
$Q_{rr}$	Reverse Recovery Charge		-	6.6	13	nC

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

# FDMA3023PZ

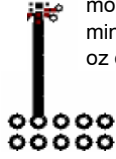
## NOTES:

1.  $R_{\theta JA}$  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.

- (a)  $R_{\theta JA} = 86$  °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. 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<sup>2</sup> 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.



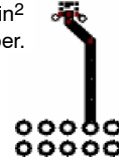
a).86 °C/W when mounted on a 1 in<sup>2</sup> pad of 2 oz copper.



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



c).69 °C/W when mounted on a 1 in<sup>2</sup> pad of 2 oz copper.



d).151 °C/W when mounted on a minimum pad of 2 oz copper.

2. Pulse Test: Pulse Width  $\leq 300$   $\mu$ s, Duty Cycle  $\leq 2.0\%$

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

TYPICAL CHARACTERISTICS  $T_c = 25^\circ\text{C}$  unless otherwise noted

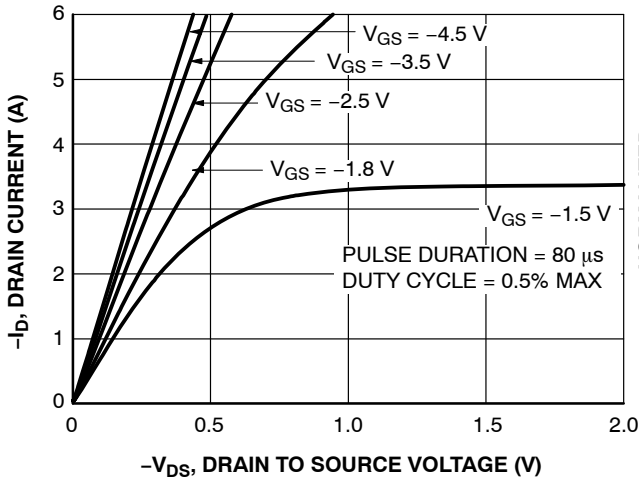


Figure 1. On-Region Characteristics

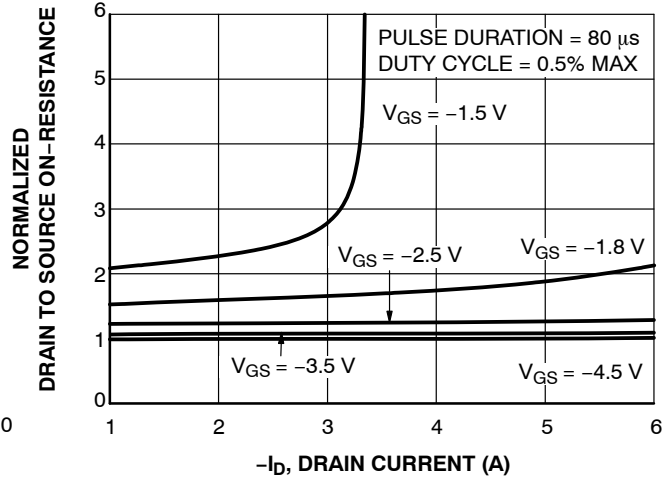


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

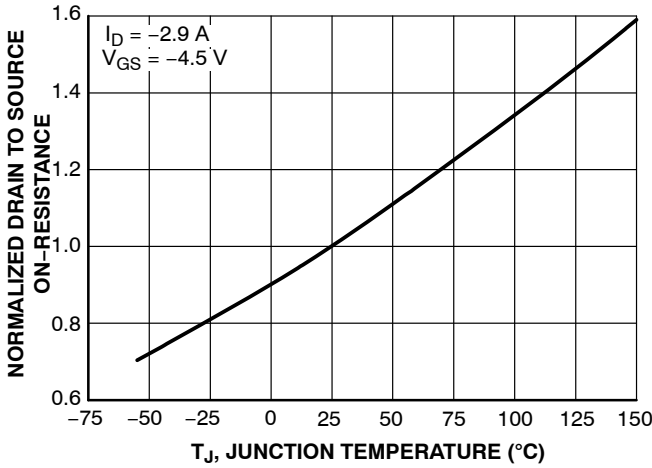


Figure 3. Normalized On-Resistance vs Junction Temperature

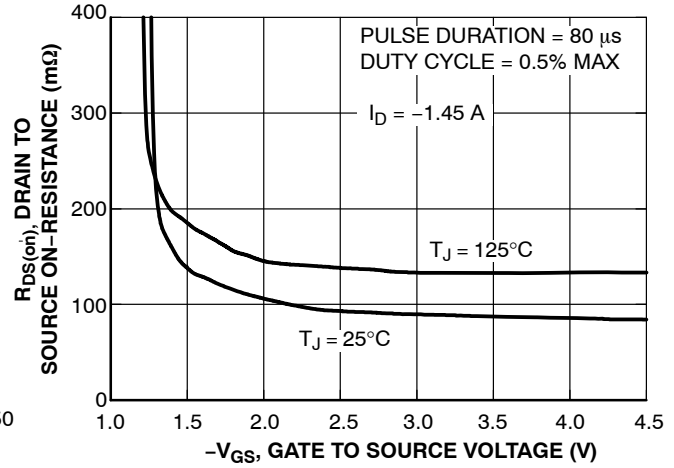


Figure 4. On-Resistance vs Gate to Source Voltage

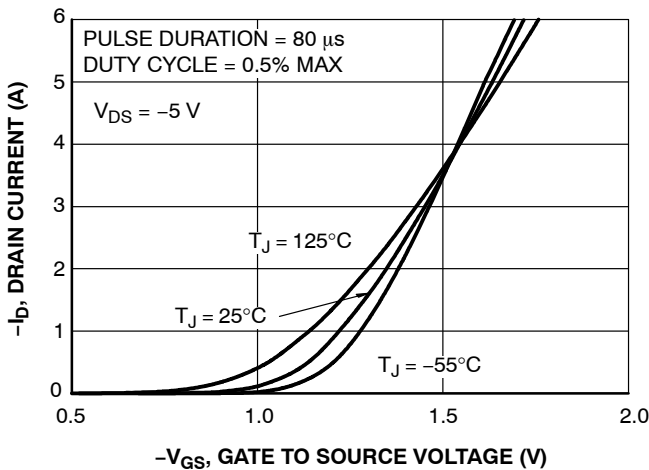


Figure 5. Transfer Characteristics

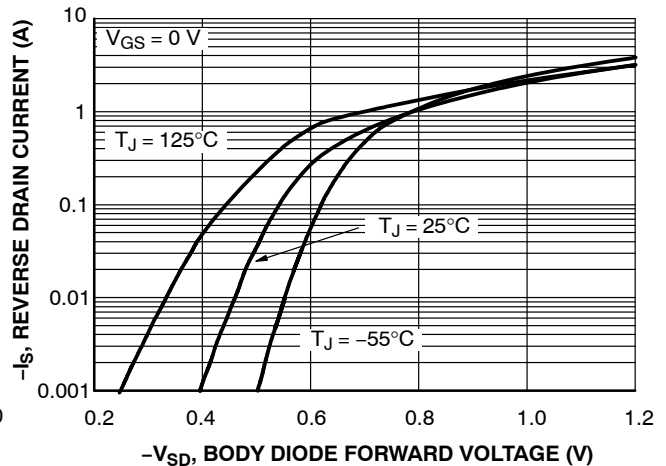


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

TYPICAL CHARACTERISTICS  $T_c = 25^\circ\text{C}$  unless otherwise noted (CONTINUED)

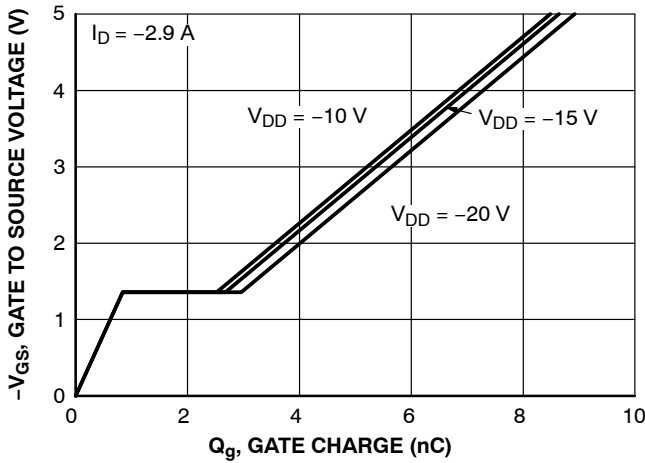


Figure 7. Gate Charge Characteristics

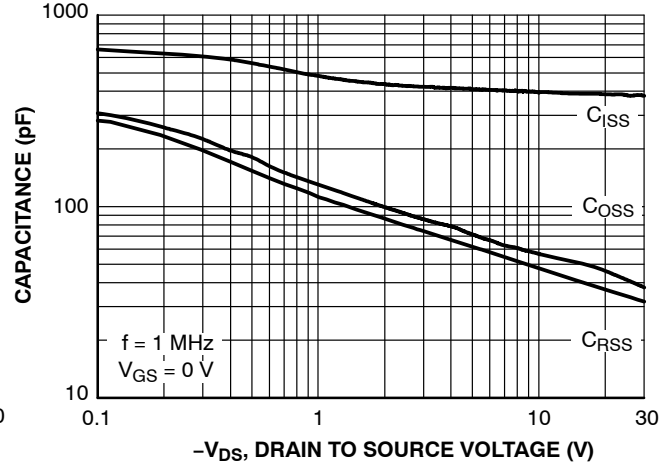


Figure 8. Capacitance vs Drain to Source Voltage

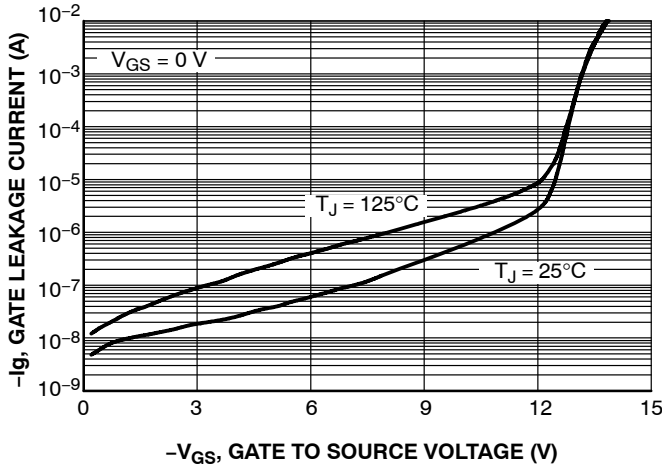


Figure 9. Gate Leakage vs Gate to Source Voltage

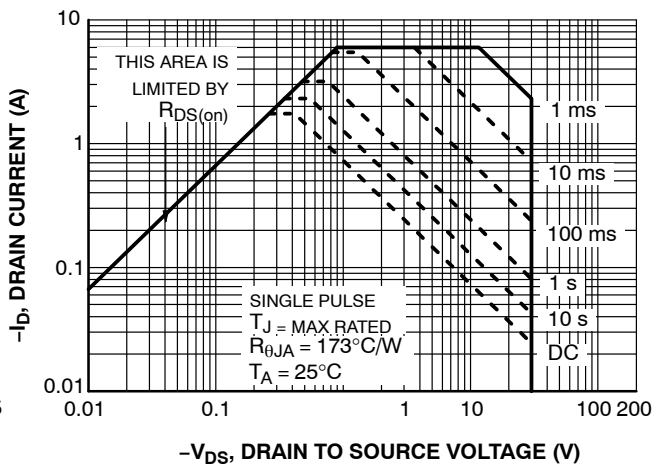


Figure 10. Forward Bias Safe Operating Area

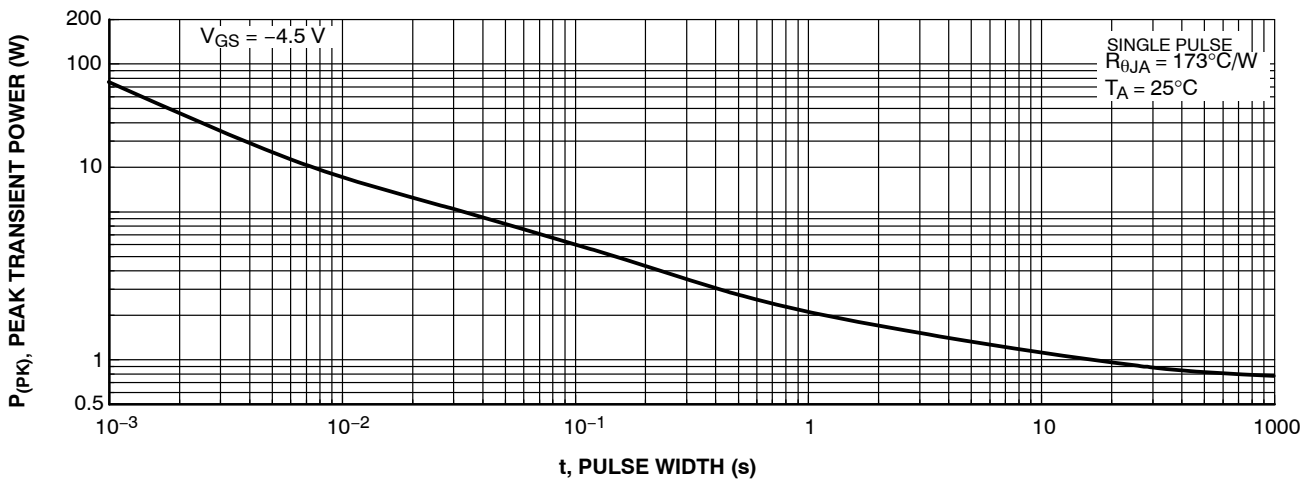


Figure 11. Single Pulse Maximum Power Dissipation

TYPICAL CHARACTERISTICS  $T_c = 25\text{ }^\circ\text{C}$  unless otherwise noted (CONTINUED)

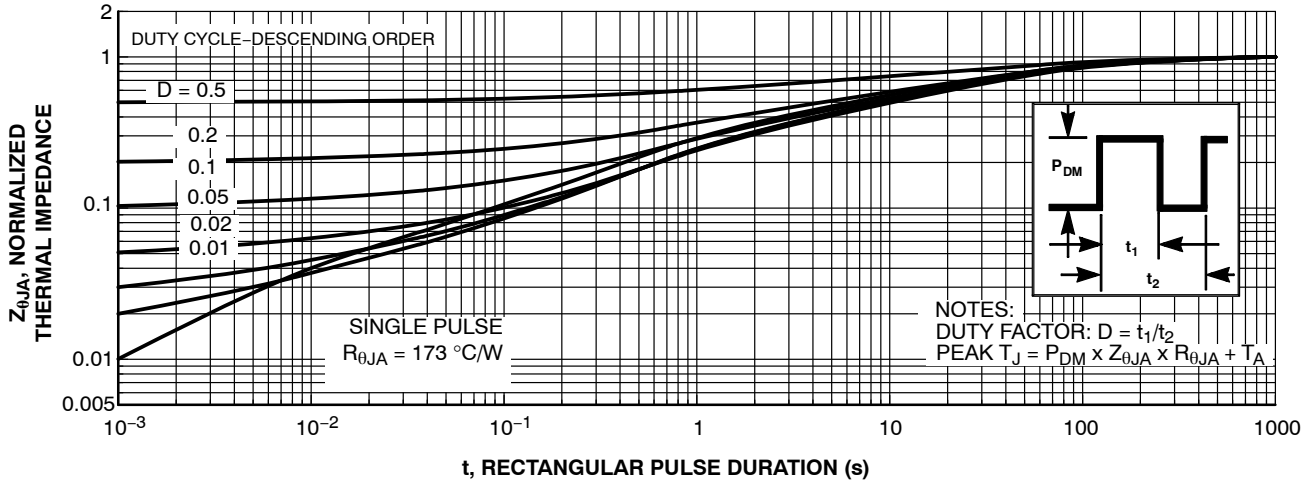


Figure 12. Junction-to-Ambient Transient Thermal Response Curve

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# MECHANICAL CASE OUTLINE

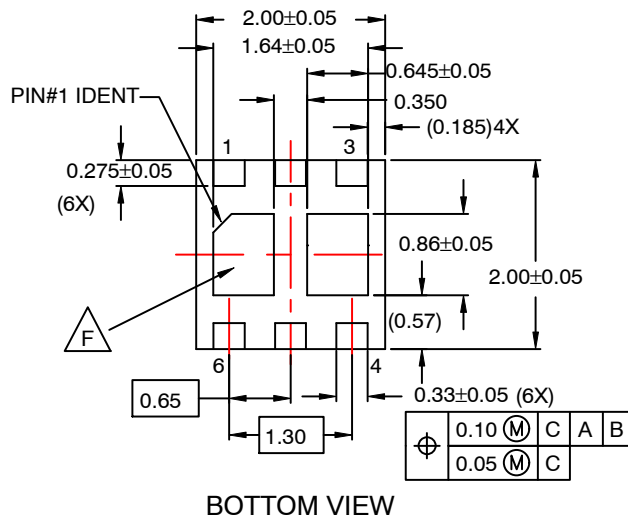
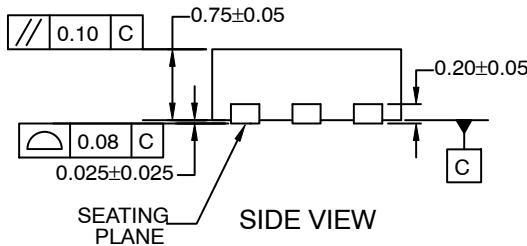
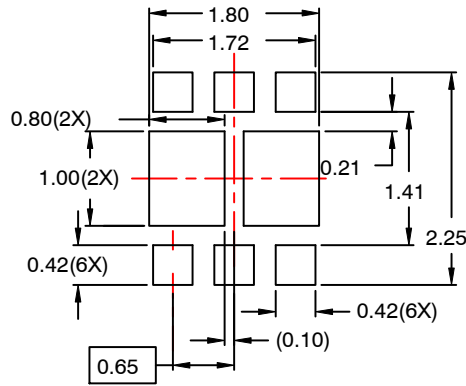
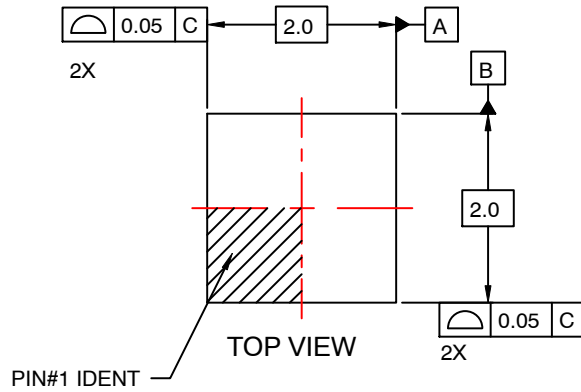
## PACKAGE DIMENSIONS

ON Semiconductor®



WDFN6 2x2, 0.65P  
CASE 511DA  
ISSUE O

DATE 31 JUL 2016



NOTES:

- A. CONFORM TO JEDEC 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.

NON-JEDEC DUAL DAP

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