

MOSFET – Dual, P-Channel, Common Drain, POWERTRENCH®

-20 V, -7 A, 36 mΩ

FDMB2308PZ

General Description

This device is designed specifically as a single package solution for Li-Ion battery pack protection circuit and other ultra-portable applications. It features two common drain P-channel MOSFETs, which enables bidirectional current flow, on onsemi's advanced POWERTRENCH process with state of the art MicroFET™ Leadframe, the FDMB2308PZ minimizes both PCB space and $r_{S1S2(on)}$.

Features

- Max $r_{S1S2(on)} = 36 \text{ m}\Omega$ at $V_{GS} = -4.5 \text{ V}$, $I_D = -5.7 \text{ A}$
- Max $r_{S1S2(on)} = 50 \text{ m}\Omega$ at $V_{GS} = -2.5 \text{ V}$, $I_D = -4.6 \text{ A}$
- Low Profile – 0.8 mm Maximum – in the New Package MicroFET™ 2x3 mm
- HBM ESD Protection Level > 2.8 kV (Note 3)
- This Device is Pb-Free, Halide Free and is RoHS Compliant

Applications

- Li-Ion Battery Pack

MOSFET MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$, unless otherwise noted)

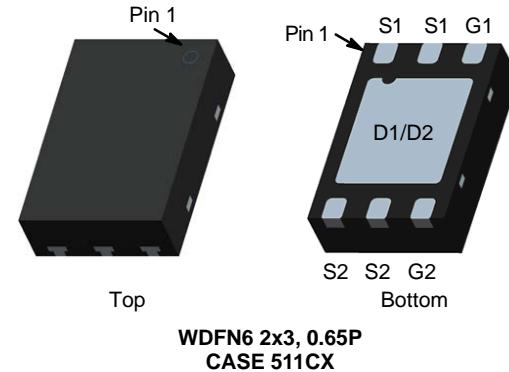
Symbol	Parameter	Ratings	Unit
V_{S1S2}	Source1 to Source2 Voltage	-20	V
V_{GS}	Gate to Source Voltage	± 12	V
I_{S1S2}	Source1 to Source2 Current –Continuous $T_A = 25^\circ\text{C}$ (Note 1a) –Pulsed	-7 -30	A
P_D	Power Dissipation $T_A = 25^\circ\text{C}$ (Note 1a) $T_A = 25^\circ\text{C}$ (Note 1b)	2.2 0.8	W
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.

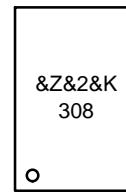
THERMAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise noted)

Symbol	Parameter	Ratings	Unit
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	57	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1b)	161	

V_{S1S2}	$r_{S1S2(on)} \text{ MAX}$	$I_{S1S2} \text{ MAX}$
-20 V	36 mΩ @ -4.5 V	-7 A
	50 mΩ @ -2.5 V	

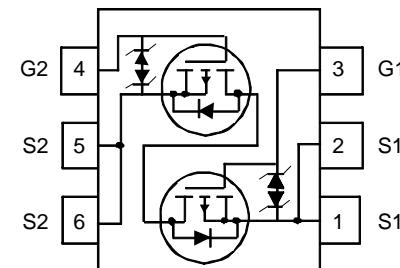


MARKING DIAGRAM



$\&Z$ = Assembly Plant Code
 $\&2$ = 2-Digit Date Code
 $\&K$ = 2-Digits Lot Run Traceability Code
308 = Specific Device Code

PIN ASSIGNMENT



ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

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

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
I_{S1S2}	Zero Gate Voltage Source1 to Source2 Current	$V_{S1S2} = -16\text{ V}$, $V_{GS} = 0\text{ V}$	—	—	-1	μA
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 12\text{ V}$, $V_{S1S2} = 0\text{ V}$	—	—	± 10	μA

ON CHARACTERISTICS

$V_{GS(\text{th})}$	Gate to Source Threshold Voltage	$V_{GS} = V_{S1S2}$, $I_{S1S2} = -250\text{ }\mu\text{A}$	-0.6	-0.9	-1.5	V
$r_{S1S2(\text{on})}$	Static Source1 to Source2 On Resistance	$V_{GS} = -4.5\text{ V}$, $I_{S1S2} = -5.7\text{ A}$	—	27	36	$\text{m}\Omega$
		$V_{GS} = -2.5\text{ V}$, $I_{S1S2} = -4.6\text{ A}$	—	36	50	
		$V_{GS} = -4.5\text{ V}$, $I_{S1S2} = -5.7\text{ A}$, $T_J = 125^\circ\text{C}$	—	35	49	
g_{FS}	Forward Transconductance	$V_{S1S2} = -5\text{ V}$, $I_{S1S2} = -5.7\text{ A}$	—	29	—	S

DYNAMIC CHARACTERISTICS

C_{iss}	Input Capacitance	$V_{S1S2} = -10\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$	—	2280	3030	pF
C_{oss}	Output Capacitance	$V_{S1S2} = -10\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$	—	361	540	pF
C_{rss}	Reverse Transfer Capacitance		—	339	510	pF

SWITCHING CHARACTERISTICS

$t_{d(\text{on})}$	Turn-On Delay Time	$V_{S1S2} = -10\text{ V}$, $I_{S1S2} = -5.7\text{ A}$, $V_{GS} = -4.5\text{ V}$, $R_{\text{GEN}} = 6\ \Omega$	—	14	25	ns
t_r	Rise Time	$V_{S1S2} = -10\text{ V}$, $I_{S1S2} = -5.7\text{ A}$, $V_{GS} = -4.5\text{ V}$, $R_{\text{GEN}} = 6\ \Omega$	—	33	52	ns
$t_{d(\text{off})}$	Turn-Off Delay Time		—	74	118	ns
t_f	Fall Time		—	58	93	ns
Q_g	Total Gate Charge		—	22	30	nC
Q_{gs}	Gate1 to Source1 Charge	$V_{G1S1} = 0\text{ V}$, $V_{G2S2} = 0\text{ V}$, $I_{fss} = -5.7\text{ A}$ (Note 2)	—	3.6	—	nC
Q_{gd}	Gate1 to Source2 "Miller" Charge		—	7.7	—	nC

DRAIN-SOURCE CHARACTERISTICS

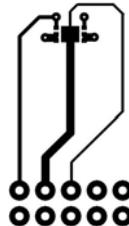
I_{fss}	Maximum Continuous Source1–Source2 Diode Forward Current	—	—	-5.7	A	
V_{fss}	Source1 to Source2 Diode Forward Voltage	$V_{G1S1} = 0\text{ V}$, $V_{G2S2} = -4.5\text{ V}$, $I_{fss} = -5.7\text{ A}$ (Note 2)	—	-1	-1.6	V

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.

1. $R_{\theta JA}$ 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. 57°C/W when mounted on a 1 in² pad of 2 oz copper



b. 161°C/W when mounted on a minimum pad of 2 oz copper

2. Pulse Test: Pulse Width < 300 μs , 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.

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

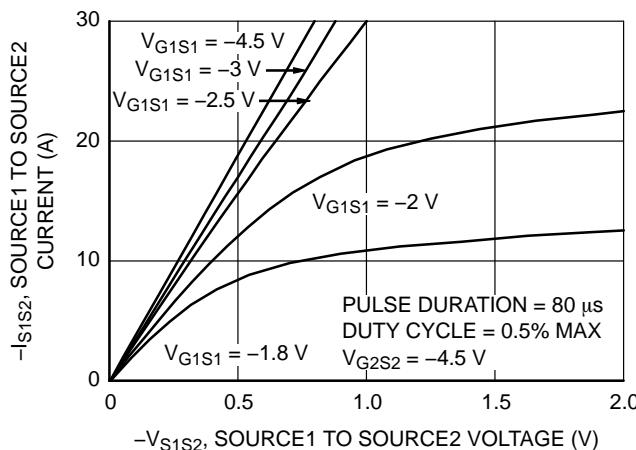


Figure 1. On-Region Characteristics

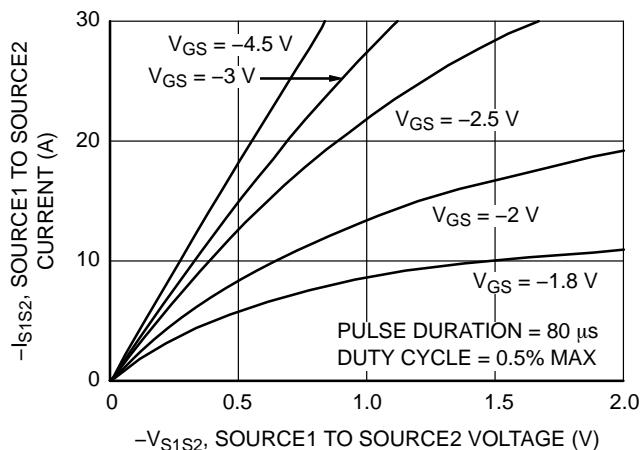


Figure 2. On-Region Characteristics

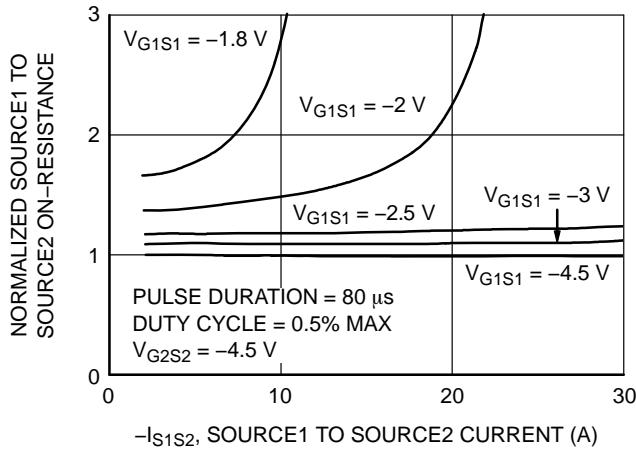


Figure 3. Normalized On-Resistance vs. Source1 to Source2 Current and Gate Voltage

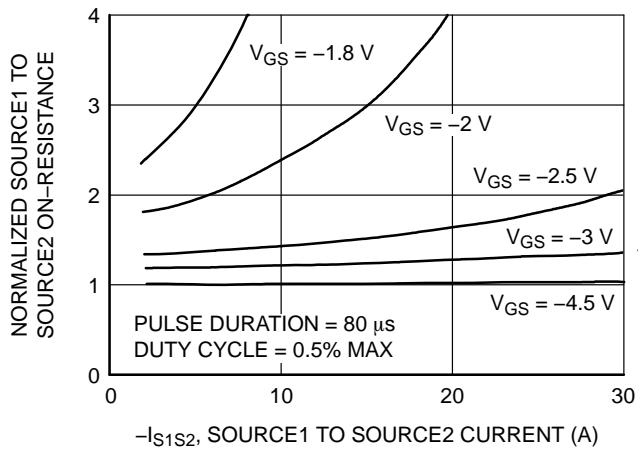


Figure 4. Normalized On-Resistance vs. Source1 to Source2 Current and Gate Voltage

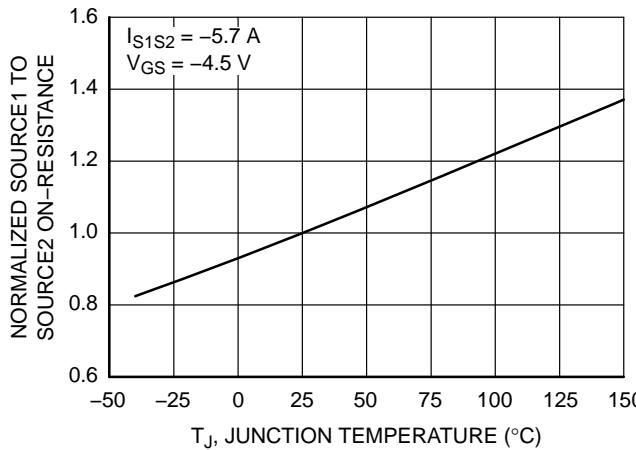


Figure 5. Normalized On Resistance vs. Junction Temperature

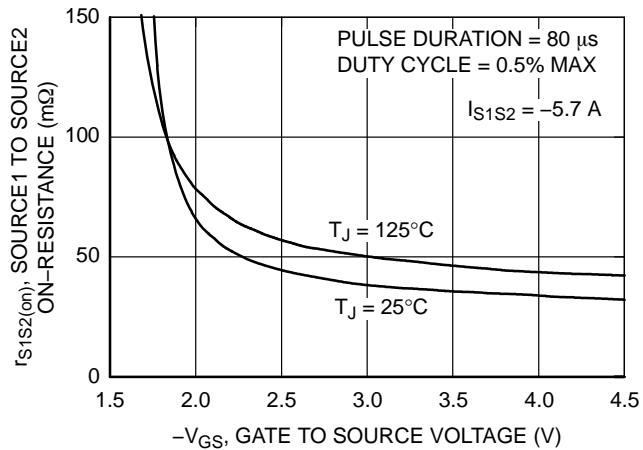


Figure 6. On Resistance vs. Gate to Source Voltage

TYPICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$, unless otherwise noted) (continued)

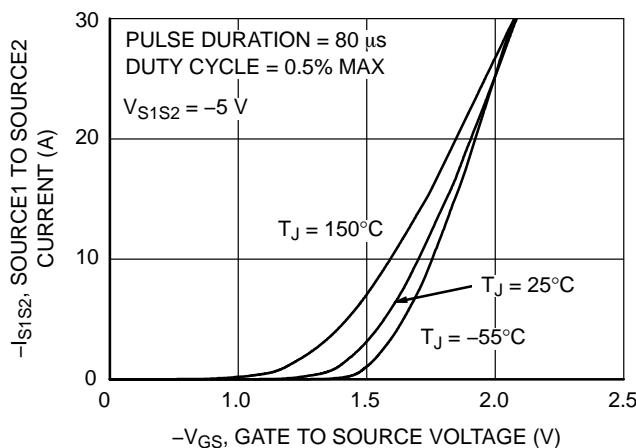


Figure 7. Transfer Characteristics

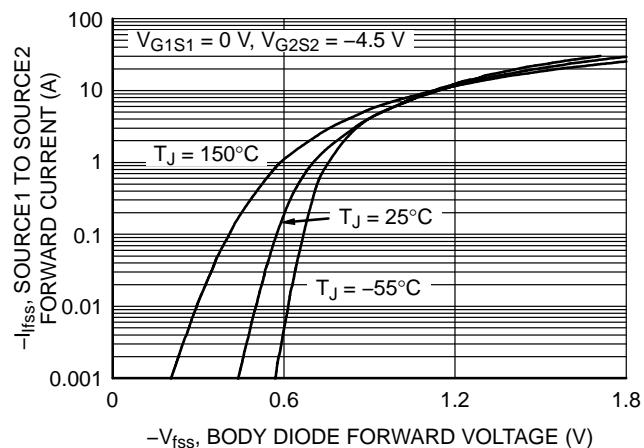


Figure 8. Source1 to Source2 Diode Forward Voltage vs. Source Current

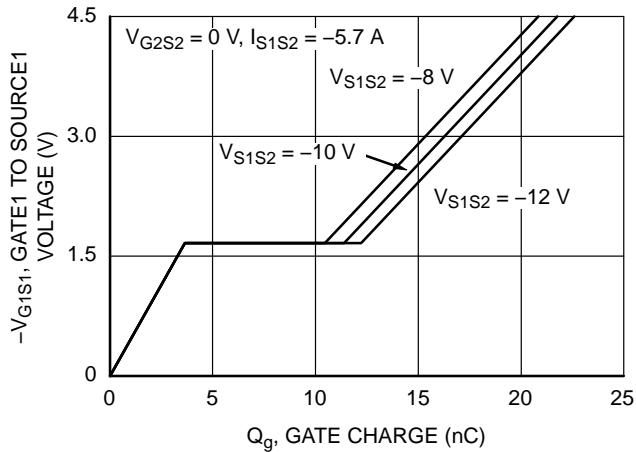


Figure 9. Gate Charge Characteristics

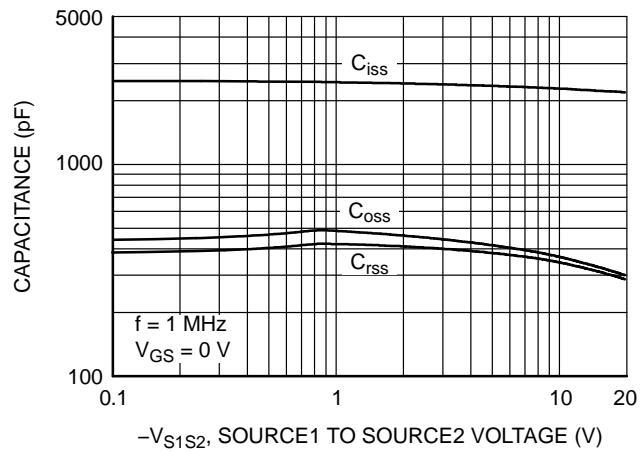


Figure 10. Capacitance vs. Source1 to Source2 Voltage

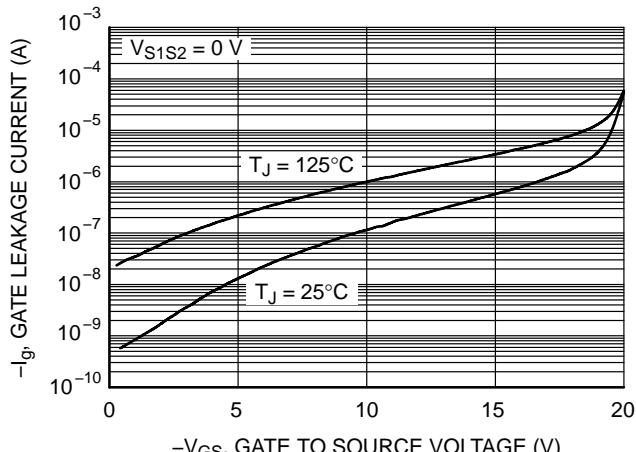


Figure 11. Gate Leakage Current vs. Gate to Source Voltage

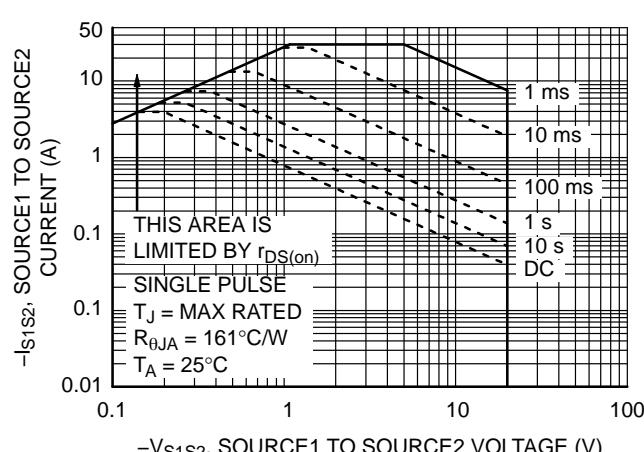


Figure 12. Forward Bias Safe Operating Area

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TYPICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$, unless otherwise noted) (continued)

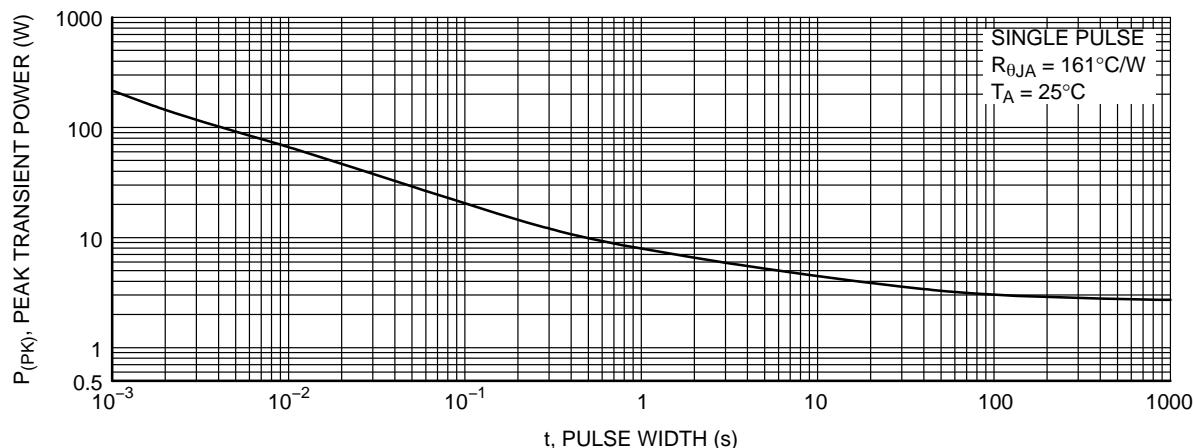


Figure 13. Single Pulse Maximum Power Dissipation

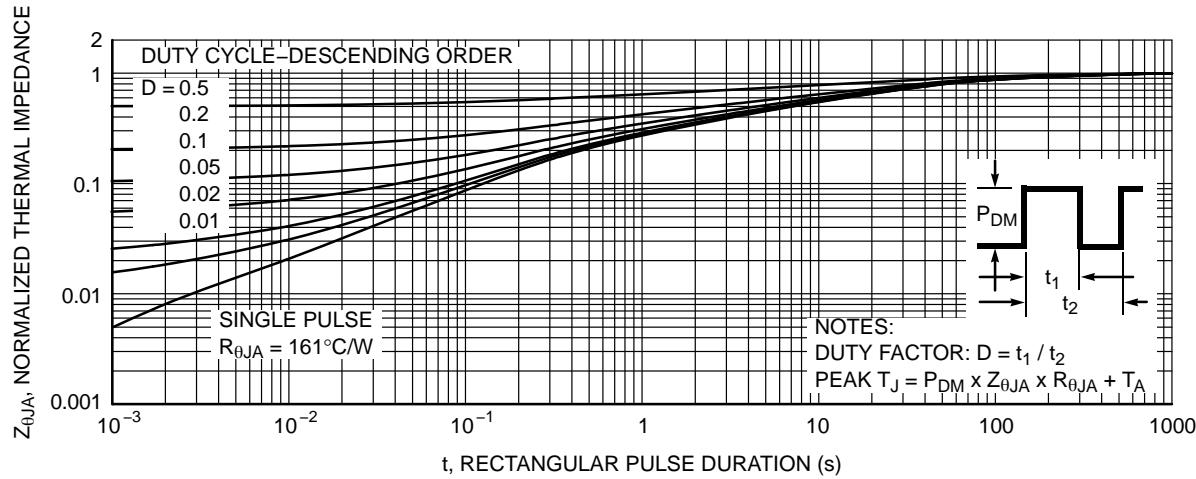


Figure 14. Junction-to-Ambient Transient Thermal Response Curve

PACKAGE MARKING AND ORDERING INFORMATION

Device	Device Marking	Package	Reel Size	Tape Width	Shipping [†]
FDMB2308PZ	308	WDFN6 2x3, 0.65P (Pb-Free, Halide Free)	7"	8 mm	3000 / Tape & Reel

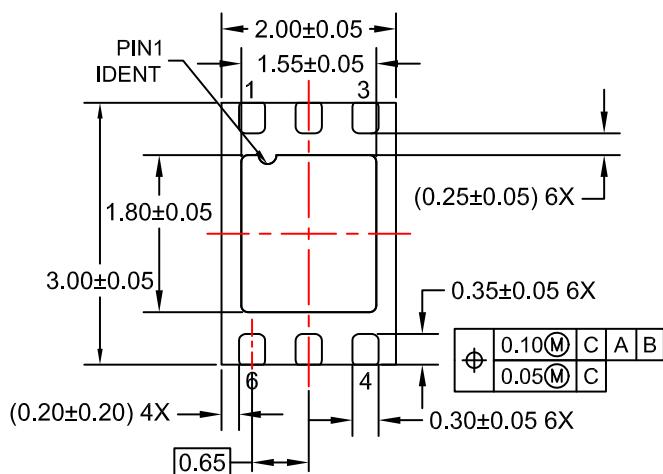
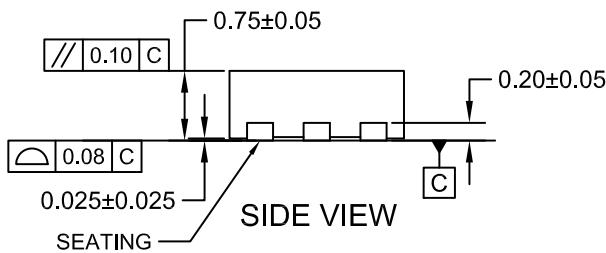
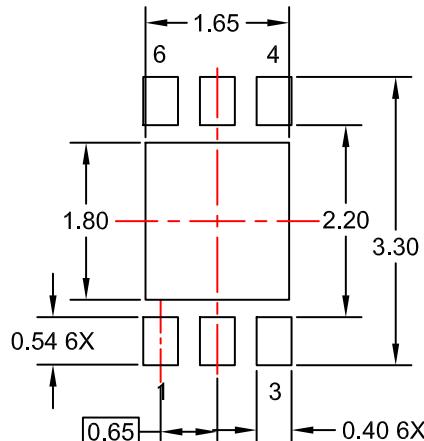
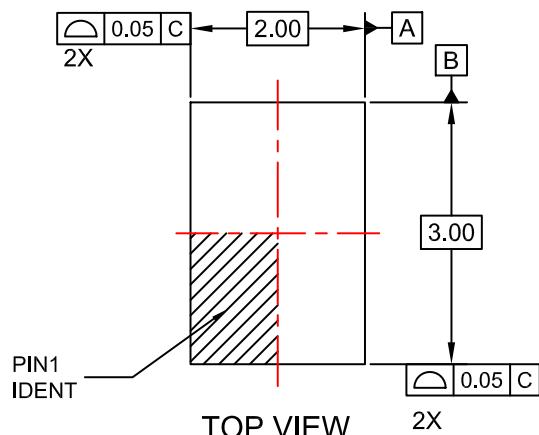
[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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WDFN6 2x3, 0.65P
CASE 511CX
ISSUE O

DATE 31 JUL 2016



NOTES:

- A. PACKAGE CONFORMS TO JEDEC MO-229 EXCEPT WHERE NOTED.
- B. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 2009.
- C. LAND PATTERN RECOMMENDATION IS EXISTING INDUSTRY LAND PATTERN.
- D. DIMENSIONS ARE IN MILLIMETERS.
- E. REFERENCE DIMENSIONS ARE UNCONTROLLED

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DESCRIPTION:	WDFN6 2X3, 0.65P	PAGE 1 OF 1

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