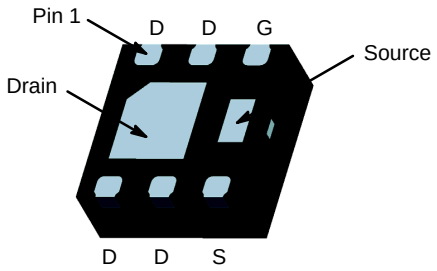
MOSFET – Single, N-Channel, 2.5 V, Specified, POWERTRENCH®

20 V, 5.7 A, 30 mΩ

FDMA420NZ

V_{DSS}	$R_{DS(on)}$ MAX	I_D MAX
20 V	30 mΩ @ 4.5 V	5.7 A
	40 mΩ @ 2.5 V	



Bottom View

WDFN6 2x2, 0.65P
(MicroFET 2x2)
CASE 511CZ

General Description

This Single N−Channel MOSFET has been designed using **onsemi**'s advanced POWERTRENCH process to optimize the $R_{DS(on)}$ @ V_{GS} = 2.5 V on special MicroFET™ leadframe.

Features

- $R_{DS(on)}$ = 30 mΩ @ V_{GS} = 4.5 V, I_D = 5.7 A
- $R_{DS(on)}$ = 40 mΩ @ V_{GS} = 2.5 V, I_D = 5.0 A
- Low Profile − 0.8 mm Maximum−in the New Package MicroFET 2x2 mm
- HBM ESD Protection Level > 2.5 kV Typical (Note 3)
- Free from Halogenated Compounds and Antimony Oxides
- This Device is Pb−Free, Halide Free and is RoHS Compliant

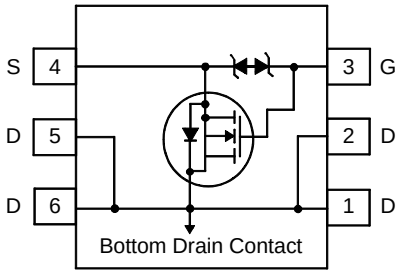
Applications

- Li−Ion Battery Pack

MARKING DIAGRAM

&Z = Assembly Plant Code
&2 = 2−Digit Date Code
&K = 2−Digits Lot Run Traceability Code
420 = Specific Device Code

PIN ASSIGNMENT



MOSFET MAXIMUM RATINGS (T_A = 25°C, unless otherwise noted)

Symbol	Parameter	Ratings	Unit
V_{DSS}	Drain−Source Voltage	20	V
V_{GSS}	Gate−Source Voltage	±12	V
I_D	Drain Current − Continuous (Note 1a) − Pulsed	 5.7 24	A
P_D	Power Dissipation (Steady State) (Note 1a) (Note 1b)	 2.4 0.9	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°C, unless otherwise noted)

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

ORDERING INFORMATION

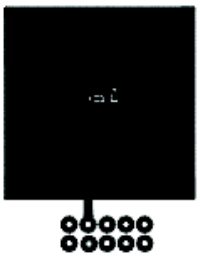
See detailed ordering and shipping information on page 5 of this data sheet.

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
B_{VDSS}	Drain−Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA	20	−	−	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C	−	12	−	mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 16 V, V_{GS} = 0 V	−	−	1	μA
I_{GSS}	Gate−Body Leakage	V_{GS} = ±12V, V_{DS} = 0 V	−	−	±10	μA
ON CHARACTERISTICS						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 μA	0.6	0.83	1.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C	−	−3.1	−	mV/°C
$R_{DS(ON)}$	Static Drain−Source On−Resistance	V_{GS} = 4.5 V, I_D = 5.7 A	−	16.8	30	mΩ
		V_{GS} = 4.0 V, I_D = 5.7 A	−	17.3	31	
		V_{GS} = 3.1 V, I_D = 5.0 A	−	18.9	33	
		V_{GS} = 2.5 V, I_D = 5.0 A	−	21.2	40	
		V_{GS} = 4.5 V, I_D = 5.7 A, T_J = 150°C	−	24.8	44	
g_{FS}	Forward Transconductance	V_{DS} = 5 V, I_D = 5.7 A	−	28.3	−	S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	V_{DS} = 10 V, V_{GS} = 0 V, f = 1.0 MHz	−	701	935	pF
C_{oss}	Output Capacitance		−	163	220	pF
C_{rss}	Reverse Transfer Capacitance		−	125	190	pF
R_G	Gate Resistance	f = 1.0 MHz	−	1.92	−	Ω
SWITCHING CHARACTERISTICS						
$t_{d(on)}$	Turn−On Delay Time	V_{DD} = 10 V, I_D = 1 A V_{GS} = 4.5 V, R_{GEN} = 6 Ω	−	9.8	20	ns
t_r	Turn−On Rise Time		−	8.6	18	ns
$t_{d(off)}$	Turn−Off Delay Time		−	21.5	43	ns
t_f	Turn−Off Fall Time		−	8.6	18	ns
Q_g	Total Gate Charge	V_{DS} = 10 V, I_D = 5.7 A, V_{GS} = 4.5 V	−	8.8	12	nC
Q_{gs}	Gate−Source Charge		−	0.9	2	nC
Q_{gd}	Gate−Drain Charge		−	2.4	4	nC
DRAIN−SOURCE CHARACTERISTICS						
I_S	Maximum Continuous Drain−Source Diode Forward Current		−	−	2.0	A
V_{SD}	Drain−Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 2.0 A	−	0.69	1.2	V
t_{rr}	Diode Reverse Recovery Time	I_F = 5.7 A, di/dt = 100 A/μs	−	−	20	ns
Q_{rr}	Diode Reverse Recovery Charge		−	−	5	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.

1. $R_{\theta JA}$ is the sum of the junction−to−case and case−to−ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins.



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

b. 145°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.

TYPICAL CHARACTERISTICS (T_J = 25°C, unless otherwise noted)

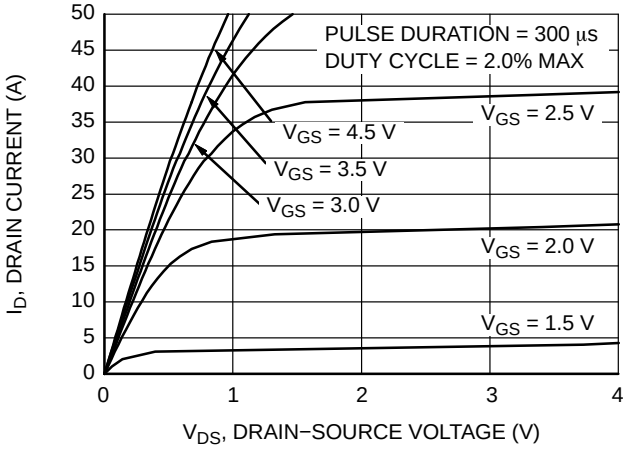


Figure 1. On Region Characteristics

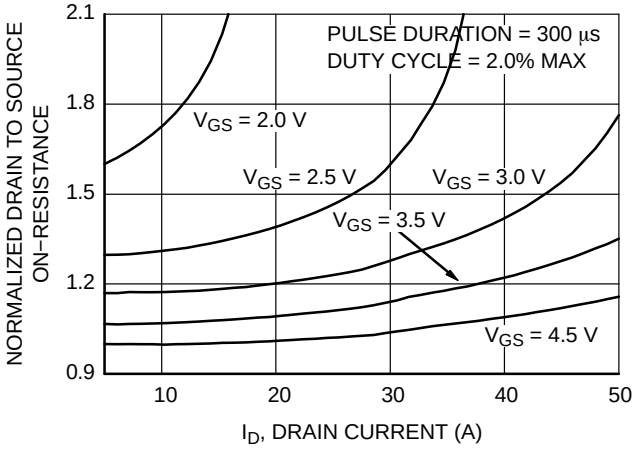


Figure 2. On−Resistance vs. Drain Current and Gate Voltage

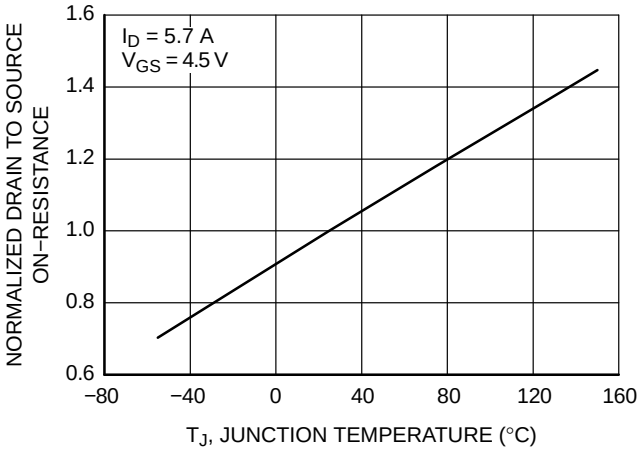


Figure 3. Normalized On Resistance vs. Junction Temperature

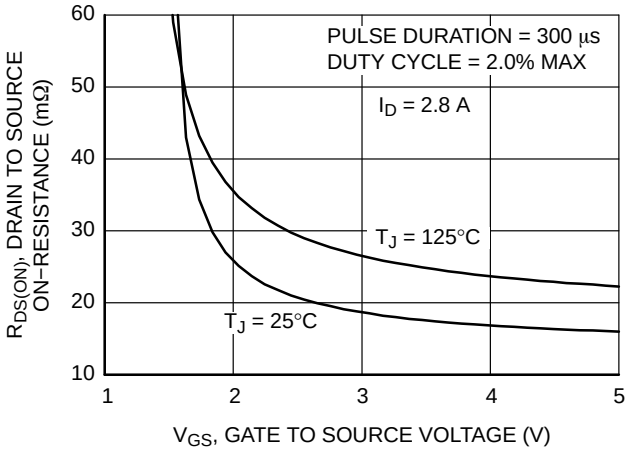


Figure 4. On−Resistance vs. Gate to Source Voltage

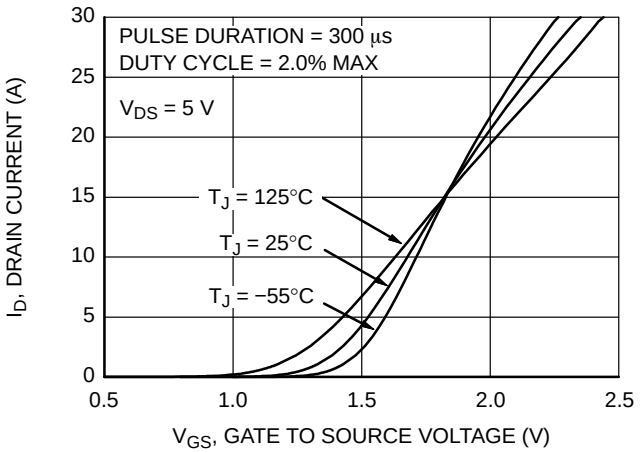


Figure 5. Transfer Characteristics

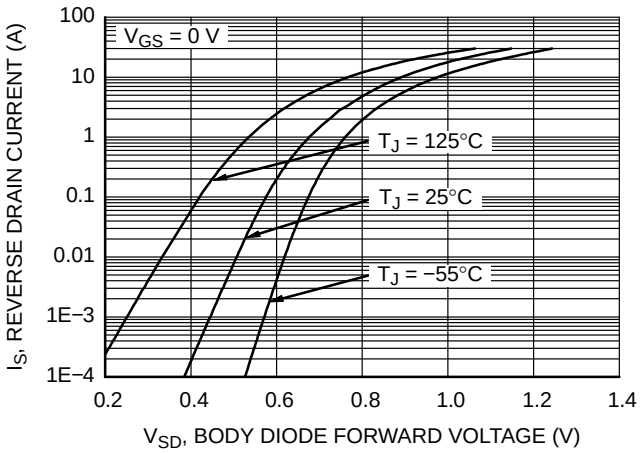


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

TYPICAL CHARACTERISTICS (T_J = 25°C, unless otherwise noted) (continued)

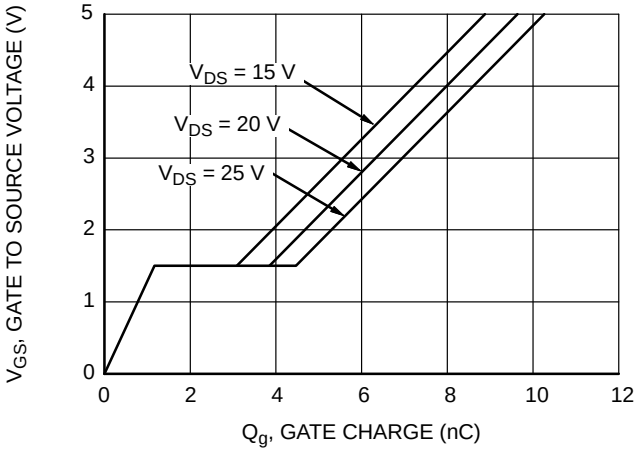


Figure 7. Gate Charge Characteristics

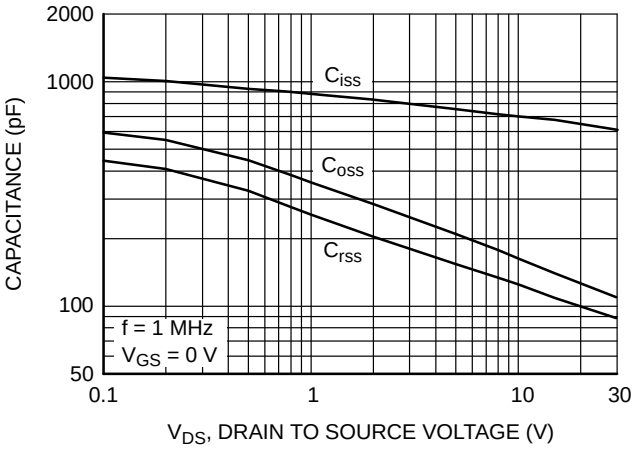


Figure 8. Capacitance vs. Drain to Source Voltage

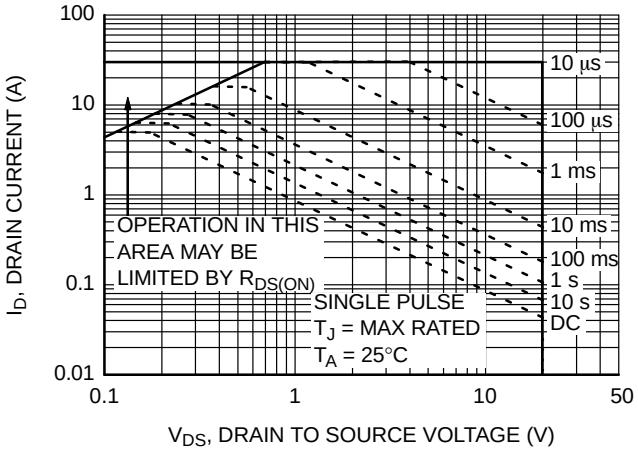


Figure 9. Forward Bias Safe Operating Area

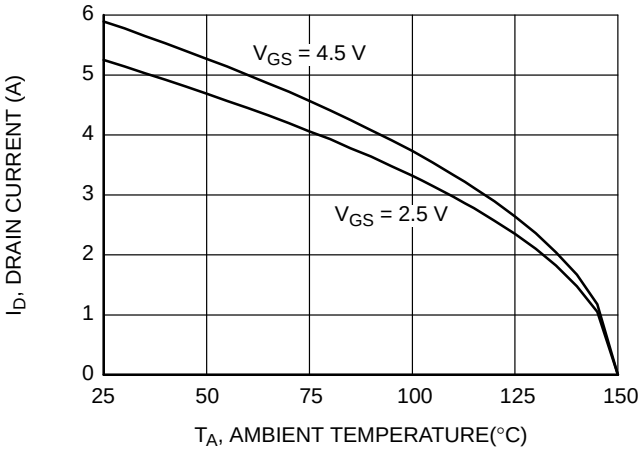


Figure 10. Maximum Continuous Drain Current vs. Ambient Temperature

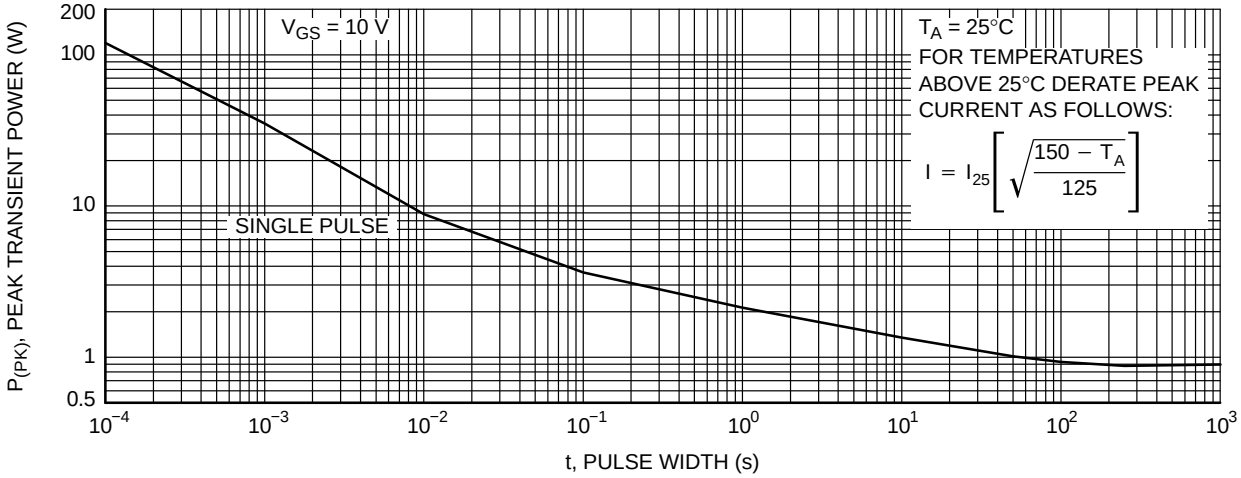


Figure 11. Single Pulse Maximum Power Dissipation

TYPICAL CHARACTERISTICS (T_J = 25°C, unless otherwise noted) (continued)

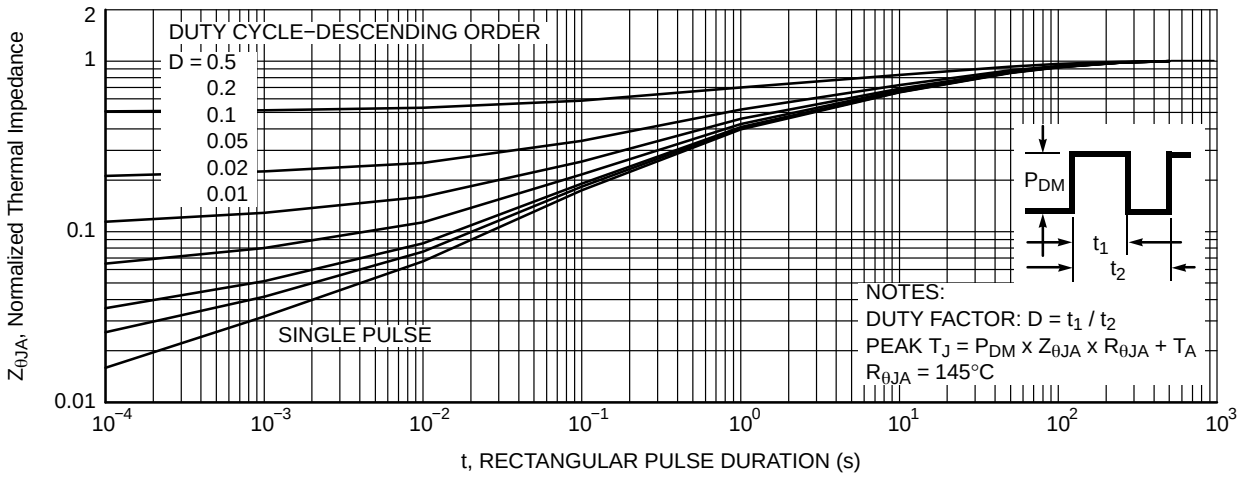


Figure 12. Transient Thermal Response Curve

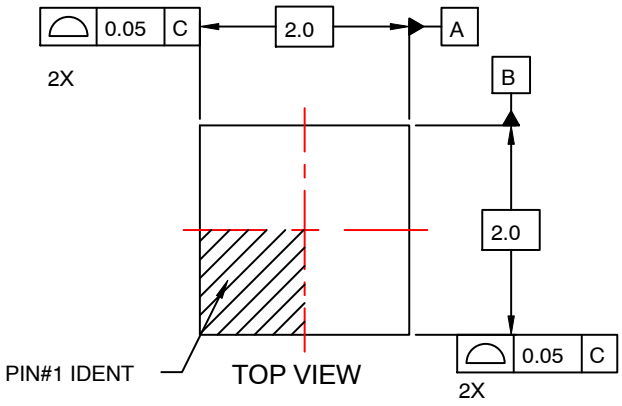
PACKAGE MARKING AND ORDERING INFORMATION

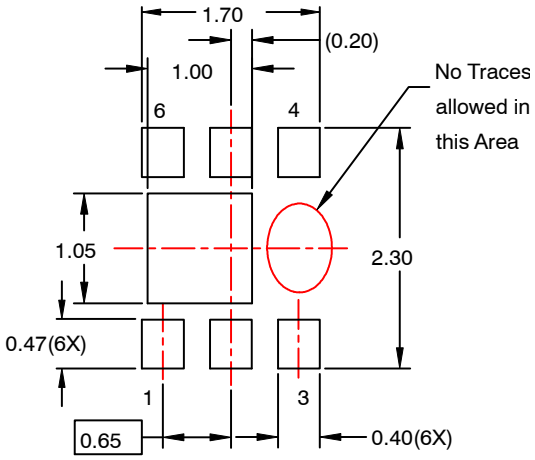
Device	Device Marking	Package	Reel Size	Tape Width	Shipping†
FDMA420NZ	420	WDFN6 2x2, 0.65P (MicroFET 2x2) (Pb−Free, Halide Free)	7”	8 mm	3000 / Tape & Reel

†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.

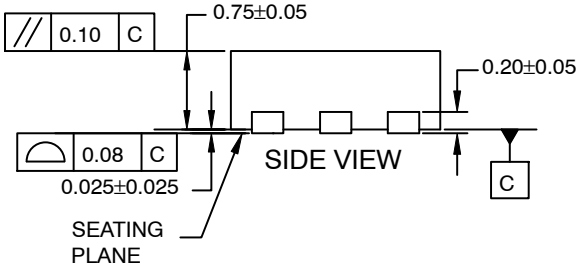
WDFN6 2x2, 0.65P
CASE 511CZ
ISSUE O

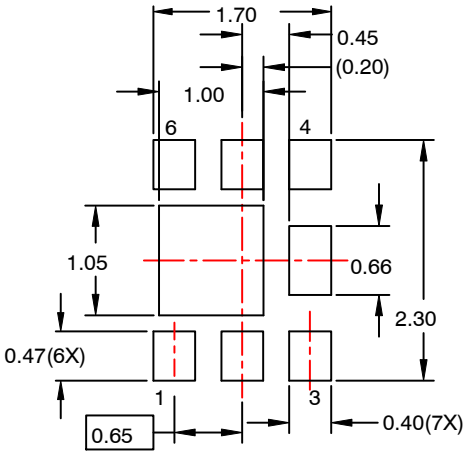
DATE 31 JUL 2016





RECOMMENDED
LAND PATTERN OPT 1





RECOMMENDED
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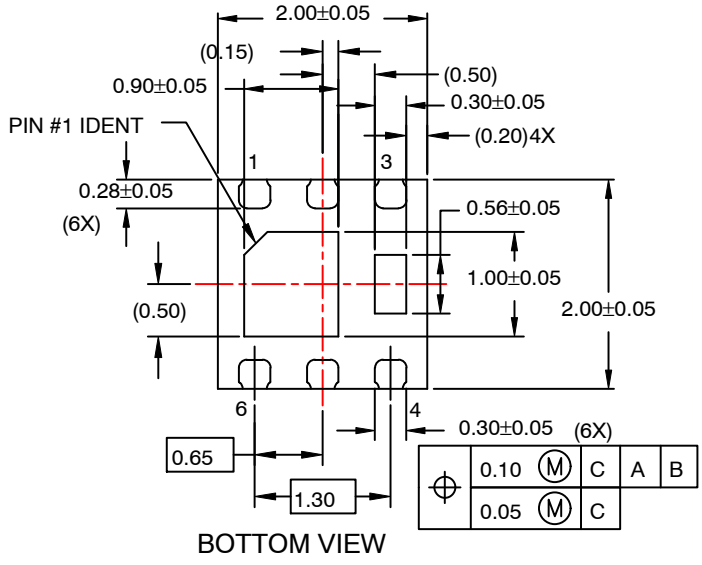

NOTES:

A. PACKAGE DOES NOT FULLY CONFORM TO JEDEC MO−229 REGISTRATION

B. DIMENSIONS ARE IN MILLIMETERS.

C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 2009.

D. LAND PATTERN RECOMMENDATION IS EXISTING INDUSTRY LAND PATTERN.

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DESCRIPTION:	**WDFN6 2X2, 0.65P**		**PAGE 1 OF 1**

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:
Technical Library: www.onsemi.com/design/resources/technical−documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support
For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales