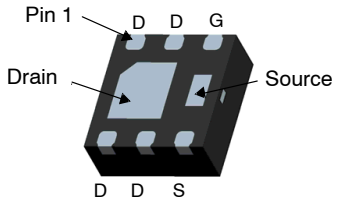
MOSFET – Single N-Channel, POWERTRENCH®

100 V, 2.2 A, 243 mΩ

FDMA86108LZ



WDFN6 (MicroFET™ 2 x 2)
CASE 511CZ

General Description

This device has been designed to provide maximum efficiency and thermal performance for synchronous buck converters. The low $r_{DS(on)}$ and gate charge provide excellent switching performance.

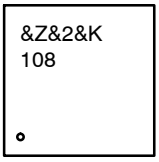
Features

- Max $r_{DS(on)}$ = 243 mΩ at V_{GS} = 10 V, I_D = 2.2 A
- Max $r_{DS(on)}$ = 366 mΩ at V_{GS} = 4.5 V, I_D = 1.8 A
- Low Profile – 0.8 mm Maximum in the New Package MicroFET™ 2 x 2 mm
- Free from Halogenated Compounds and Antimony Oxides
- This Device is Pb–Free and is RoHS Compliant

Application

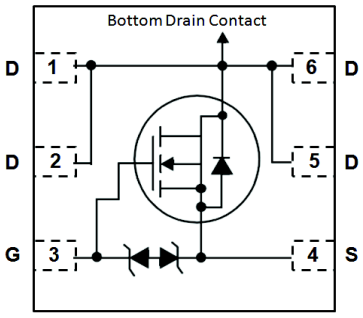
- DC–DC Buck Converters

MARKING DIAGRAM



&Z	= Assembly Plant Code
&2	= Numeric Date Code
&K	= Lot Code
108	= Specific Device Code

PIN ASSIGNMENT



ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

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

Symbol	Parameter	Ratings	Unit
V_{DS}	Drain to Source Voltage	100	V
V_{GS}	Gate to Source Voltage	±20	V
I_D	Drain Current – Continuous T_A = 25°C (Note 1a)	2.2	A
	– Pulsed (Note 3)	6	
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

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

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	

PACKAGE MARKING AND ORDERING INFORMATION

Device Marking	Device	Package	Shipping†
108	FDMA86108LZ	WDFN6 (MicroFET 2x2) (Pb−Free)	3000 Units / 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.

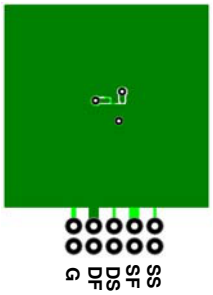
ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0 V	100			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25°C		74		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 80 V, V_{GS} = 0 V			1	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±20 V, V_{DS} = 0 V			±10	μA
ON CHARACTERISTICS						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 250 μA	1.0	2.2	3.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25°C		−5		mV/°C
$r_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 2.2 A		188	243	mΩ
		V_{GS} = 4.5 V, I_D = 1.8 A		275	366	
		V_{GS} = 10 V, I_D = 2.2 A, T_J = 125°C		345	446	
g_{FS}	Forward Transconductance	V_{DD} = 5 V, I_D = 2.2 A		3.7		S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	V_{DS} = 50 V, V_{GS} = 0 V, f = 1 MHz		116	163	pF
C_{oss}	Output Capacitance			23	35	
C_{rss}	Reverse Transfer Capacitance			1	5	
R_g	Gate Resistance		0.1	1.0	3.0	Ω
SWITCHING CHARACTERISTICS						
$td_{(on)}$	Turn − On Delay Time	V_{DD} = 50 V, I_D = 2.2 A, V_{GS} = 10 V, R_{GEN} = 6 Ω		4.2	10	ns
t_r	Rise Time			1.7	10	
$t_{D(off)}$	Turn − Off Delay Time			7.6	15	
t_f	Fall Time			1.7	10	
$Q_{g(TOT)}$	Total Gate Charge	V_{GS} = 0V to 10 V, V_{DD} = 50 V, i_D = 2.2 A		2.1	3.0	nC
		V_{GS} = 0V to 4.5 V, V_{DD} = 50 V, i_D = 2.2 A		1.1	1.6	
Q_{gs}	Gate to Source Charge	V_{DD} = 50 V, i_D = 2.2 A		0.5		
Q_{gd}	Gate to Drain “Miller” Charge			0.5		
DRAIN−SOURCE DIODE CHARACTERISTICS						
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 2.2 A (Note 2)		0.9	1.2	V
t_{rr}	Reverse Recovery Time	I_F = 2.2 A, di/dt = 100 A/μs		32	51	ns
Q_{rr}	Reverse Recovery Charge			20	32	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.

NOTES:

1. $R_{\theta JA}$ is determined with the device mounted on a 1 in^2 pad 2 oz copper pad on a 1.5 × 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) 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. Pulsed I_D measured at 250 μS, refer to Figure 11 SOA graph for more details.

TYPICAL CHARACTERISTICS

(T_J = 25°C unless otherwise noted)

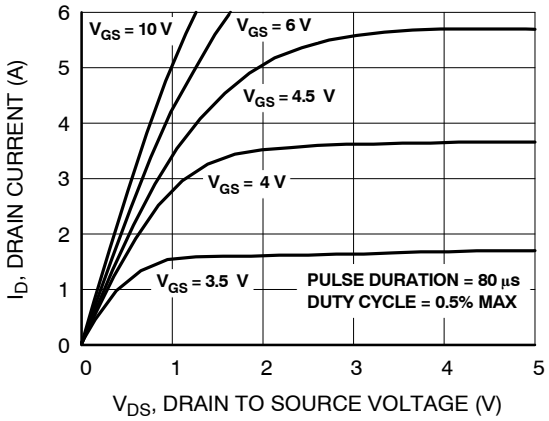


Figure 1. On−Region Characteristics

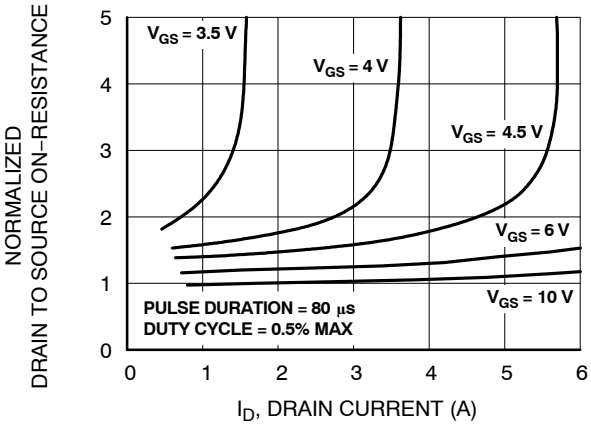


Figure 2. Normalized On−Resistance vs Drain Current and Gate Voltage

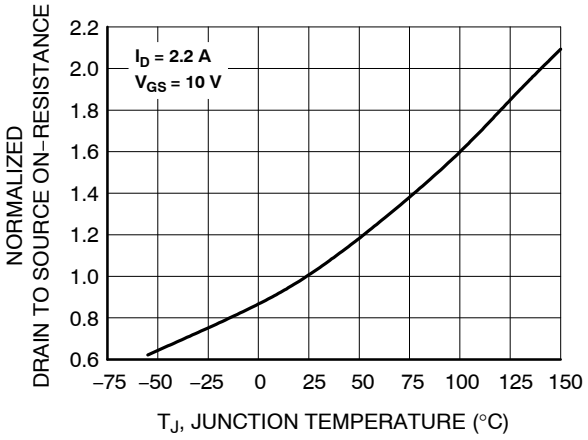


Figure 3. Normalized On−Resistance vs Junction Temperature

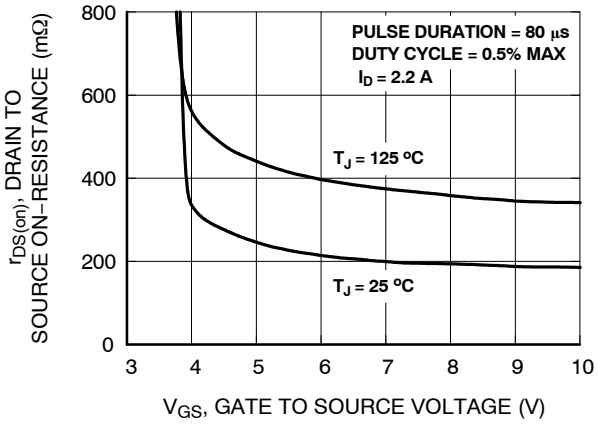


Figure 4. On−Resistance vs Gate to Source Voltage

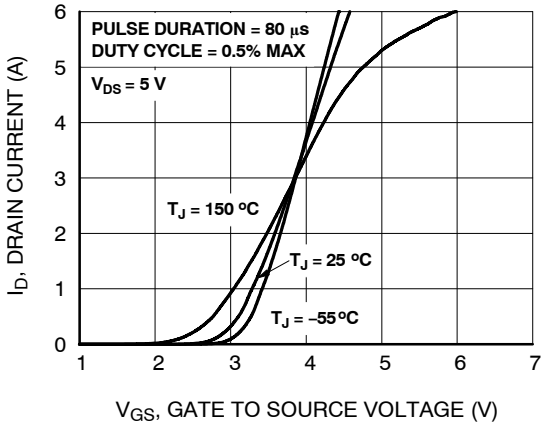


Figure 5. Transfer Characteristics

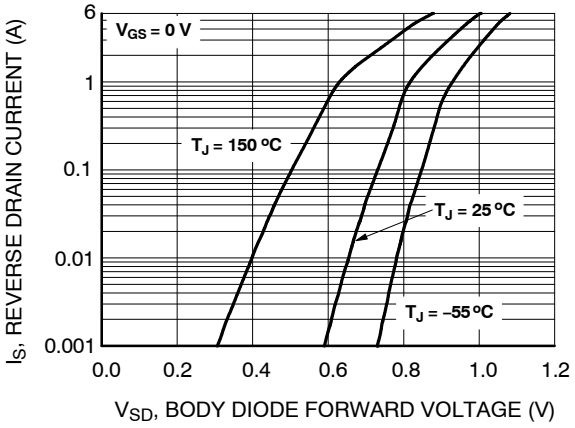


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

TYPICAL CHARACTERISTICS (continued)

(T_J = 25°C unless otherwise noted)

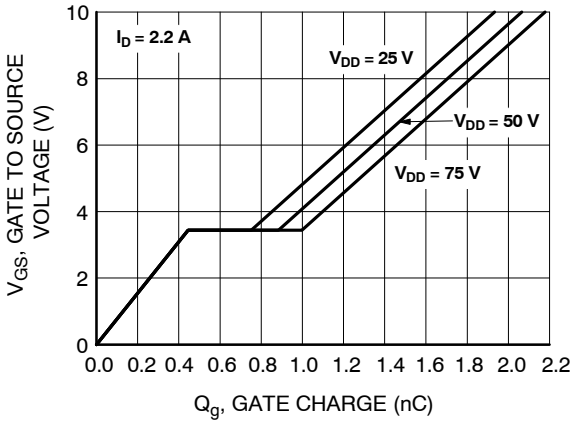


Figure 7. Gate Charge Characteristics

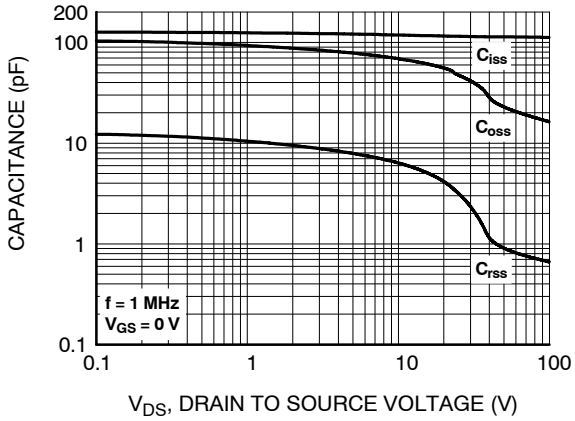


Figure 8. Capacitance vs Drain to Source Voltage

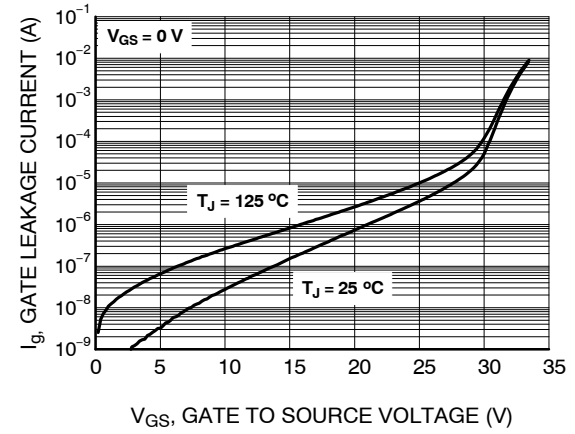


Figure 9. Gate Leakage Current vs. Gate to Source Voltage

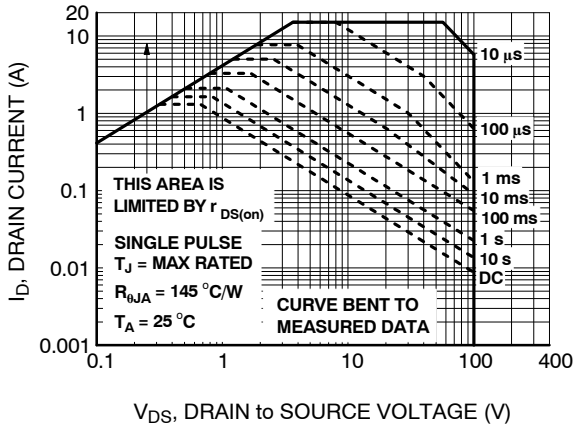


Figure 10. Forward Bias Safe Operating Area

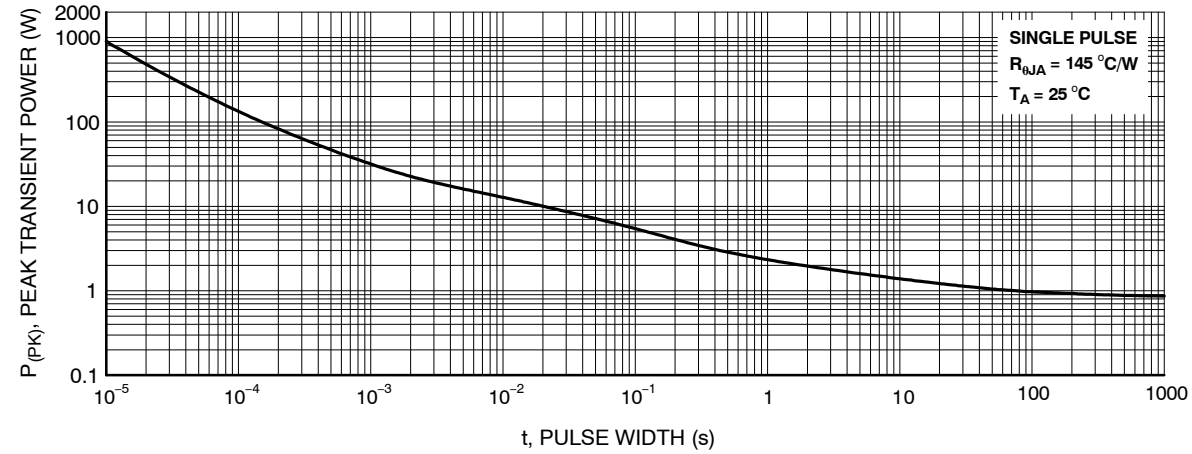


Figure 11. Single Pulse Maximum Power Dissipation

TYPICAL CHARACTERISTICS (continued)

(T_J = 25°C unless otherwise noted)

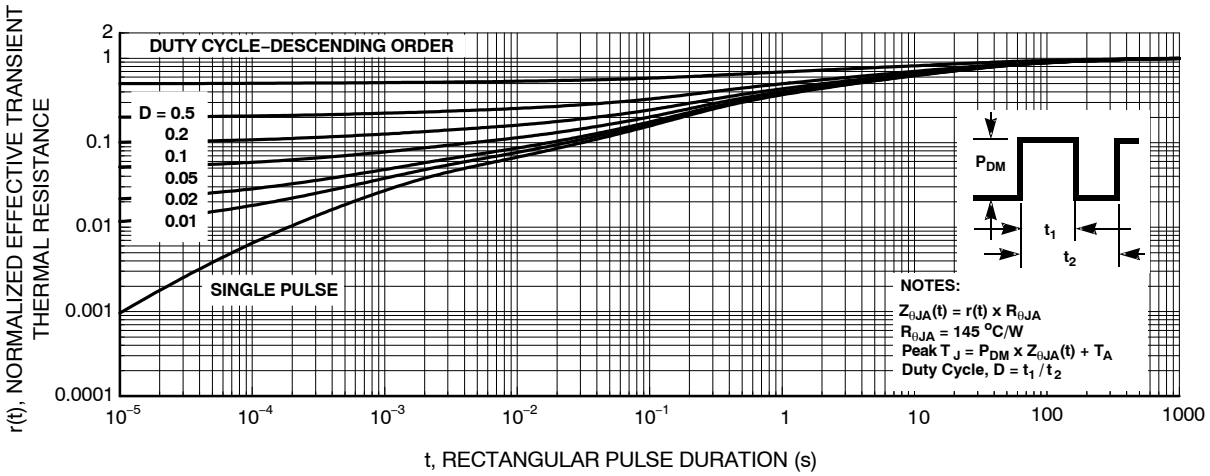
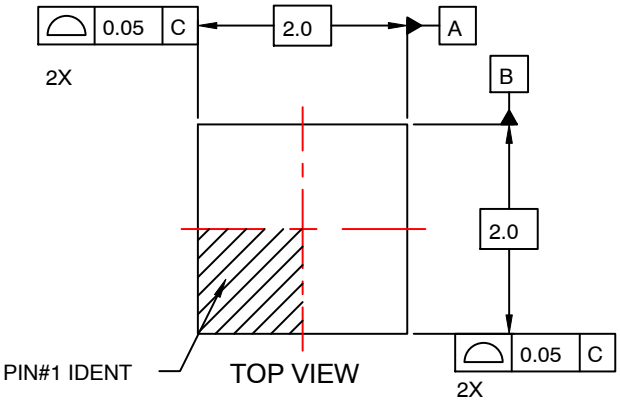
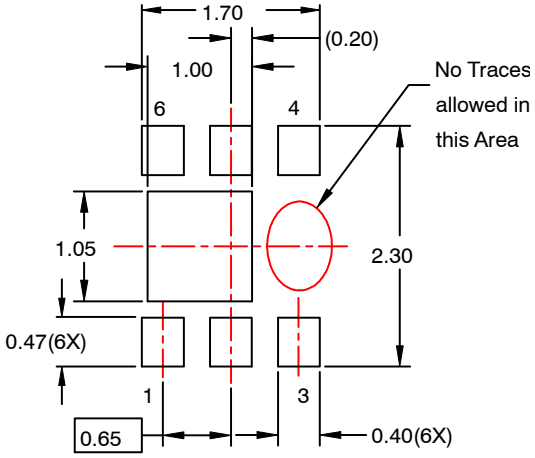


Figure 12. Junction to Ambient Transient Thermal Response Curve

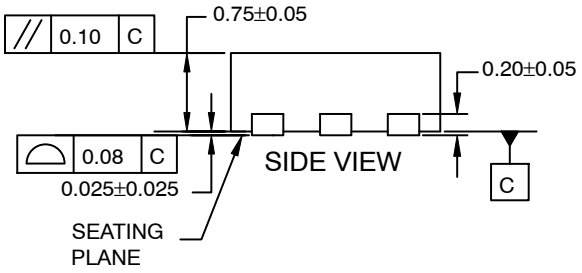
WDFN6 2x2, 0.65P
CASE 511CZ
ISSUE O

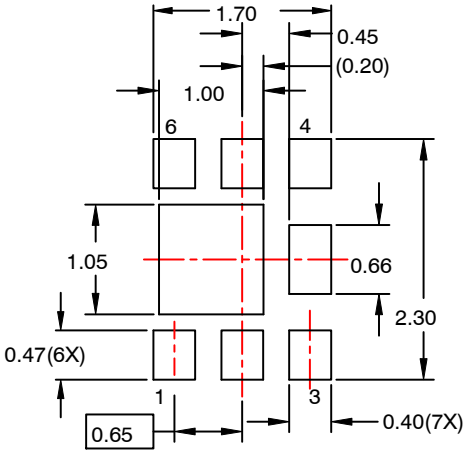
DATE 31 JUL 2016





RECOMMENDED
LAND PATTERN OPT 1





RECOMMENDED
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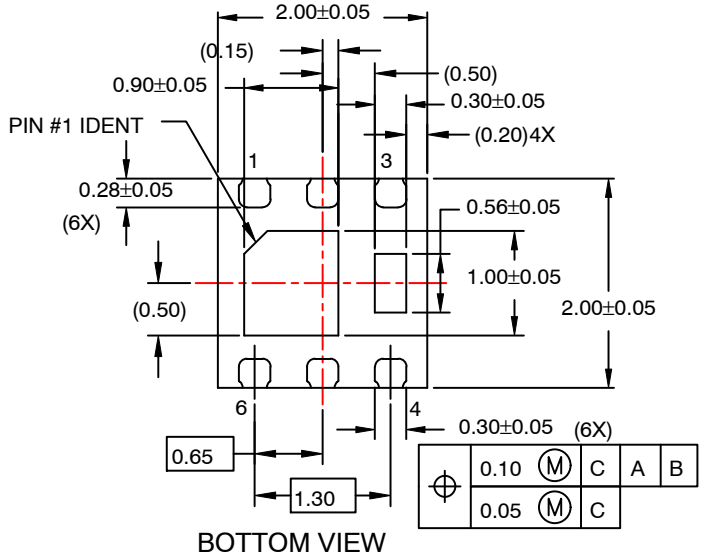

BOTTOM VIEW

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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