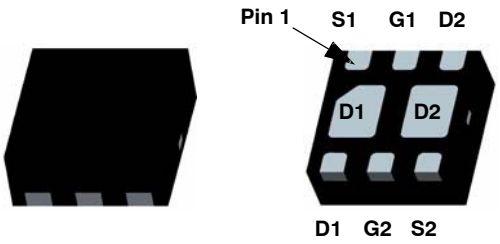
MOSFET – Dual N-Channel, POWERTRENCH®

20 V, 5.0 A, 54 mΩ

FDMA1024NZ



WDFN6 2x2, 0.65P
(MicroFET™ 2x2)
CASE 511DA

General Description

This is designed specifically as a single package solution for dual switching requirements in cellular handset and other ultra−portable applications. It features two independent N−Channel MOSFETs with low on−state resistance for minimum conduction losses.

The MicroFET™ 2x2 package offers exceptional thermal performance for its physical size and is well suited to linear mode applications.

Features

- Max $r_{DS(on)}$ = 54 mΩ at V_{GS} = 4.5 V, I_D = 5.0 A
- Max $r_{DS(on)}$ = 66 mΩ at V_{GS} = 2.5 V, I_D = 4.2 A
- Max $r_{DS(on)}$ = 82 mΩ at V_{GS} = 1.8 V, I_D = 2.3 A
- Max $r_{DS(on)}$ = 114 mΩ at V_{GS} = 1.5 V, I_D = 2.0 A
- HBM ESD Protection Level = 1.6 kV (Note 3)
- 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

Applications

- Baseband Switch
- Loadswitch
- DC−DC Buck Converters

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

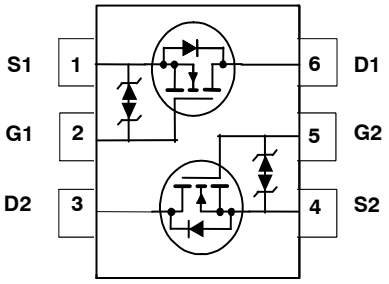
Symbol	Parameter	Ratings	Unit
V_{DS}	Drain to Source Voltage	20	V
V_{GS}	Gate to Source Voltage	±8	V
I_D	Drain Current − Continuous (Note 1a)	5.0	A
	− Pulsed	6.0	
P_D	Power Dissipation (Note 1a)	1.4	W
	Power Dissipation (Note 1b)	0.7	
T_J, T_{STG}	Operating and Storage Junction Temperature Range	−55 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	= Numeric Date Code
&K	= Lot Code
024	= Specific Device Code

PIN ASSIGNMENT



ORDERING INFORMATION

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

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THERMAL CHARACTERISTICS

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

PACKAGE MARKING AND ORDERING INFORMATION

Device Marking	Device	Package	Shipping†
024	FDMA1024NZ	WDFN6 2x2, 0.65P (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	20			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25°C		19		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 16 V, V_{GS} = 0 V			1	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±8 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	0.4	0.7	1.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25°C		−3		mV/°C
$r_{DS(on)}$	Static Drain to Source On−Resistance	V_{GS} = 4.5 V, I_D = 5.0 A		37	54	mΩ
		V_{GS} = 2.5 V, I_D = 4.2 A		43	66	
		V_{GS} = 1.8 V, I_D = 2.3 A		52	82	
		V_{GS} = 1.5 V, I_D = 2.0 A		67	114	
		V_{GS} = 4.5 V, I_D = 5.0 A, T_J = 125°C		51	75	
g_{FS}	Forward Transconductance	V_{DD} = 5 V, I_D = 5.0 A		16		S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	V_{DS} = 10 V, V_{GS} = 0 V, f = 1 MHz		375	500	pF
C_{oss}	Output Capacitance			70	95	
C_{rss}	Reverse Transfer Capacitance			40	65	
R_G	Gate Resistance	f = 1 MHz		4.3		Ω
SWITCHING CHARACTERISTICS						
$td_{(on)}$	Turn − On Delay Time	V_{DD} = 10 V, I_D = 5.0 A, V_{GS} = 4.5 V, R_{GEN} = 6 Ω		5.3	11	ns
t_r	Rise Time			2.2	10	
$t_{D(off)}$	Turn − Off Delay Time			18	33	
t_f	Fall Time			2.3	10	
Q_g	Total Gate Charge	V_{GS} = 4.5 V, V_{DD} = 10 V, i_D = 5.0 A		5.2	7.3	nC
Q_{gs}	Gate to Source Gate Charge			0.6		
Q_{gd}	Gate to Drain “Miller” Charge			0.9		

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

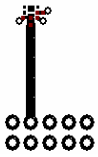
Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
DRAIN−SOURCE DIODE CHARACTERISTICS						
I_S	Maximum Continuous Source−Drain Diode Forward Current				1.1	A
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 1.1 A (Note 2)		0.7	1.2	V
t_{rr}	Reverse Recovery Time	I_F = 5.0 A, di/dt = 100 A/μs		19	35	ns
Q_{rr}	Reverse Recovery Charge			5	10	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.

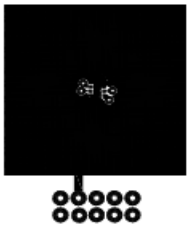
NOTES:

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) $R_{\theta JA}$ = 86 °C/W when mounted on a 1 in^2 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 a minimum pad of 2 oz copper. For single operation.
   (c) $R_{\theta JA}$ = 69 °C/W when mounted on a 1 in^2 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 a minimum pad of 2 oz copper. For dual operation.

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

d) 151°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)

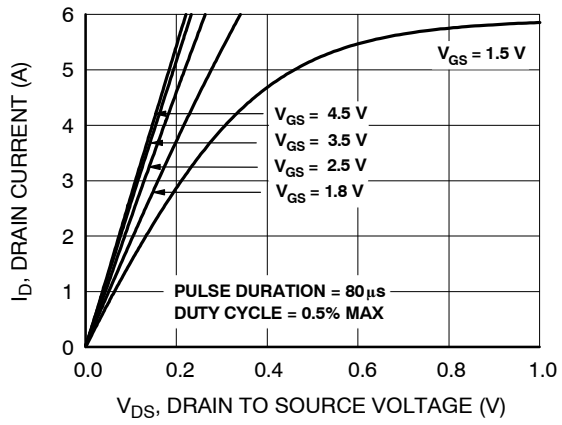


Figure 1. On−Region Characteristics

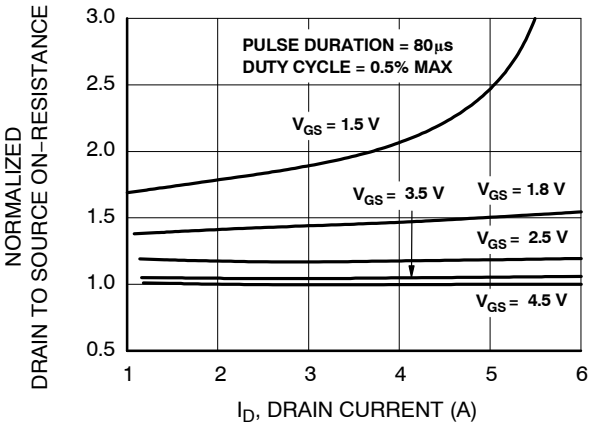


Figure 2. Normalized On−Resistance vs Drain Current and Gate Voltage

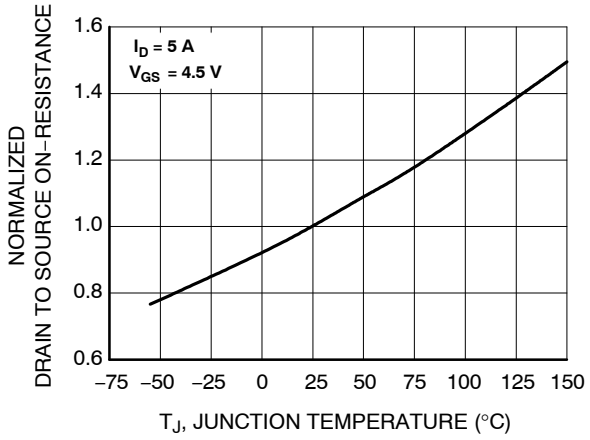


Figure 3. Normalized On−Resistance vs Junction Temperature

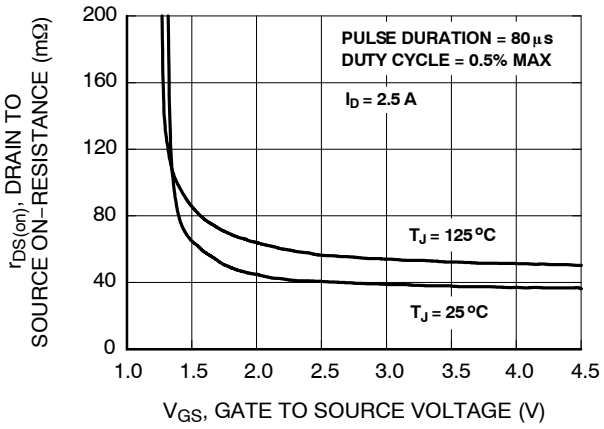


Figure 4. On−Resistance vs Gate to Source Voltage

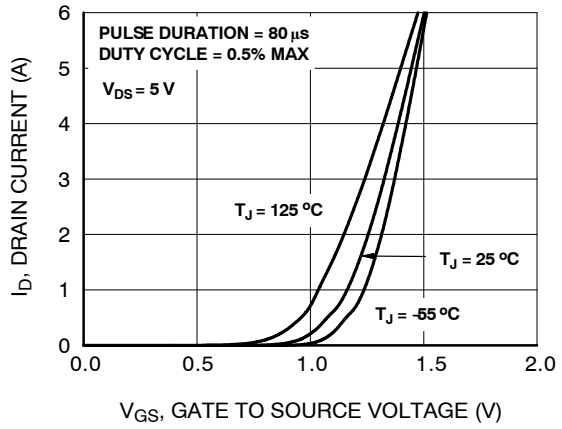


Figure 5. Transfer Characteristics

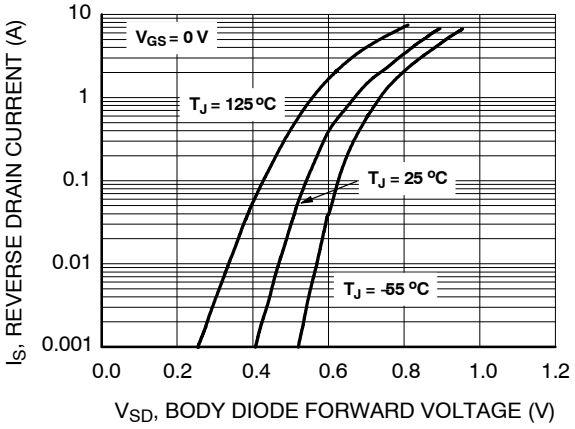


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

TYPICAL CHARACTERISTICS (continued)

(T_J = 25°C unless otherwise noted)

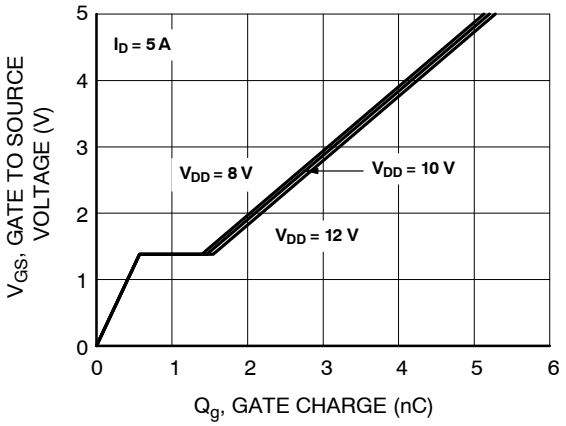


Figure 7. Gate Charge Characteristics

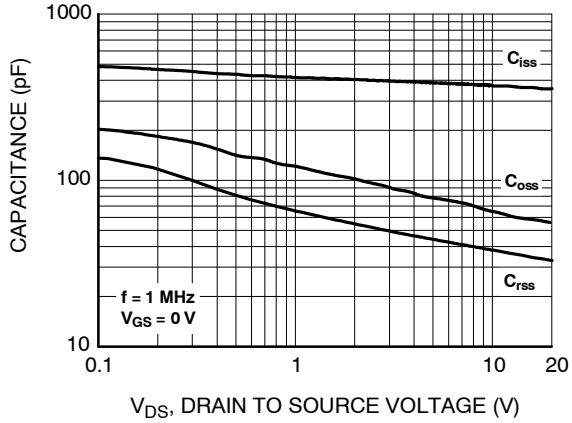


Figure 8. Capacitance vs Drain to Source Voltage

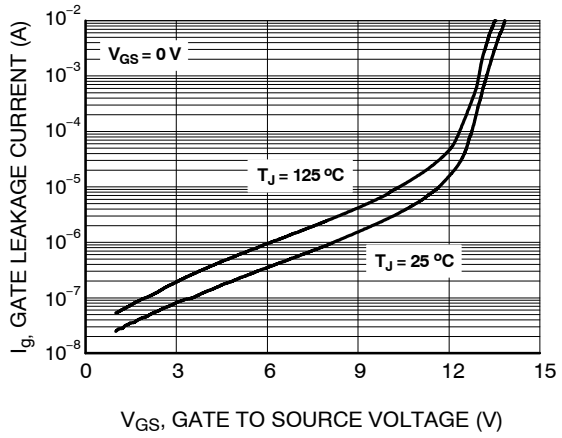


Figure 9. Gate Leakage Current vs. Gate to Source Voltage

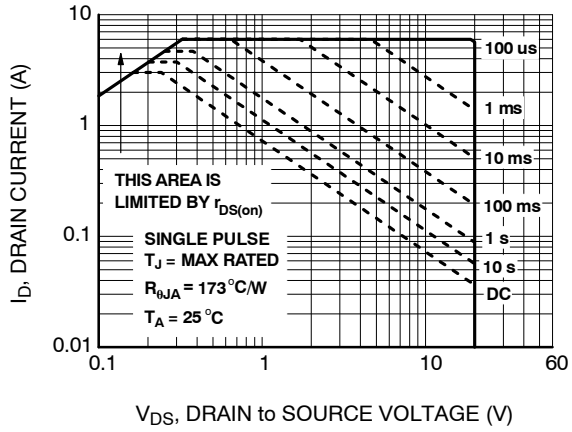


Figure 10. Forward Bias Safe Operating Area

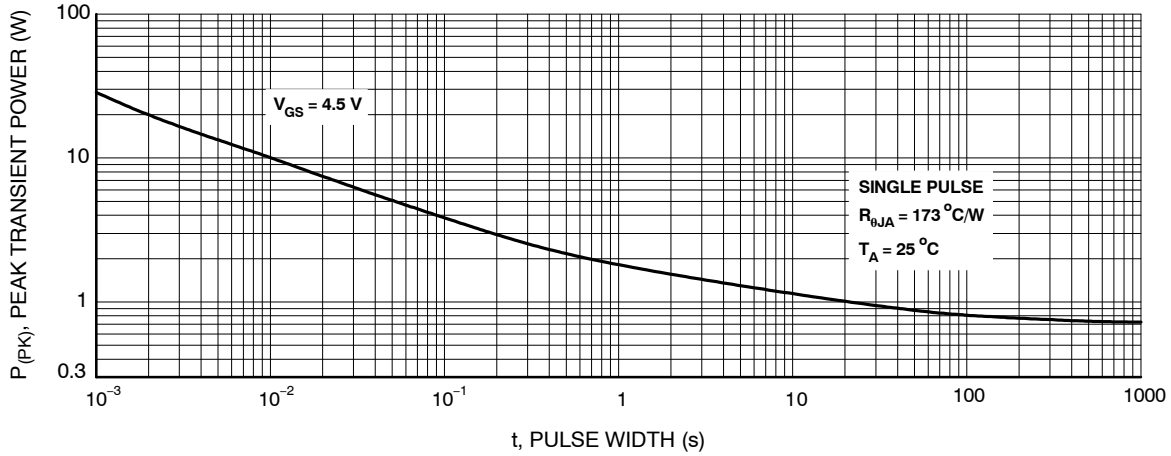


Figure 11. Single Pulse Maximum Power Dissipation

TYPICAL CHARACTERISTICS (continued)

(T_J = 25°C unless otherwise noted)

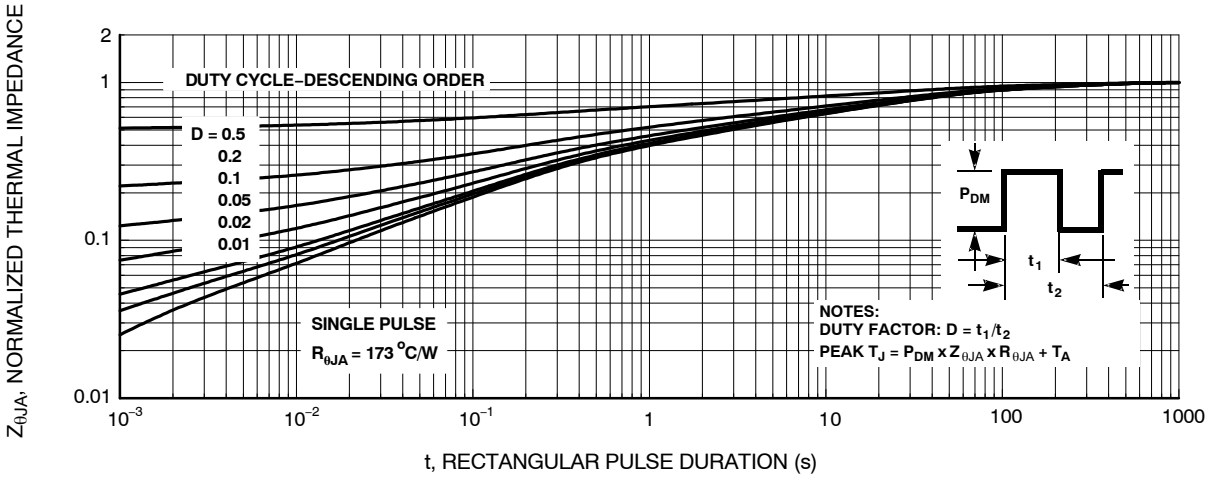


Figure 12. Junction to Ambient Transient Thermal Response Curve

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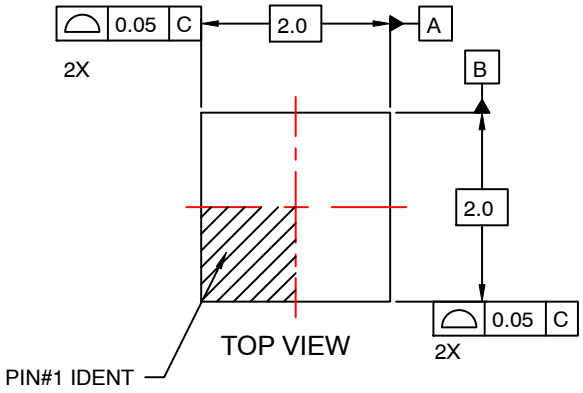

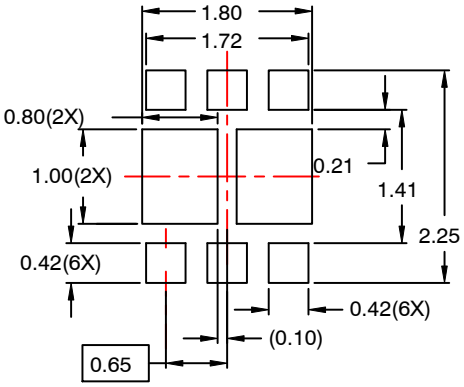

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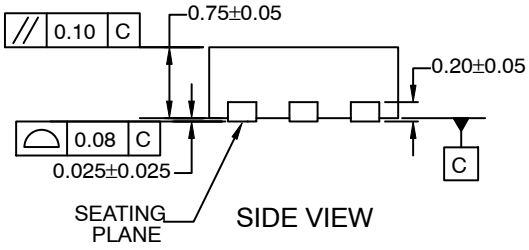

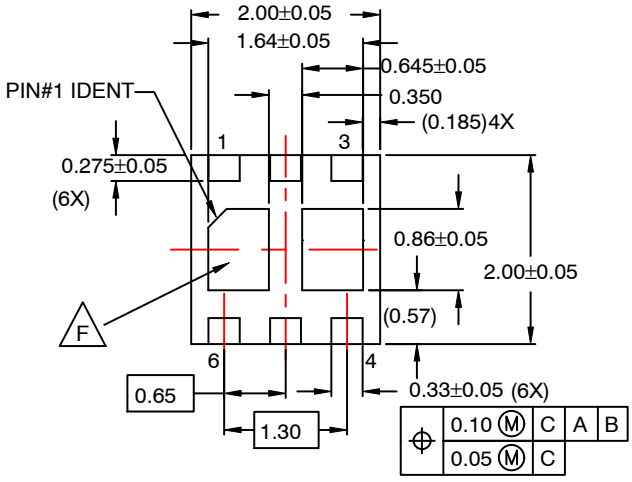

NOTES:

A. CONFORM TO JADEC 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.

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