

SN54ALS33A, SN74ALS33A QUADRUPLE 2-INPUT POSITIVE-NOR BUFFERS WITH OPEN-COLLECTOR OUTPUTS

SDAS034C – APRIL 1982 – REVISED FEBRUARY 2009

- Package Options Include Plastic Small-Outline (D) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) 300-mil DIPs

description

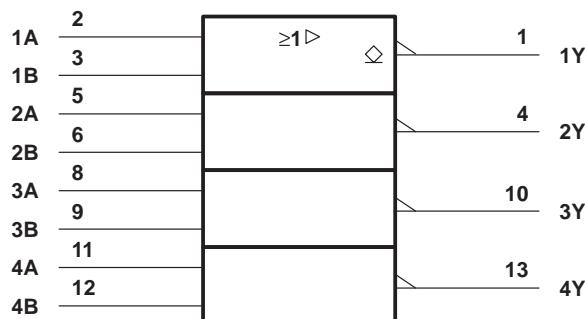
These devices contain four independent 2-input positive-NOR buffers with open-collector outputs. Open-collector outputs require resistive pullup to perform correctly. They can deliver higher V_{OH} levels and commonly are used in wired-AND applications. These devices perform the Boolean functions $Y = \overline{A} \bullet \overline{B}$ or $Y = \overline{A} + \overline{B}$ in positive logic.

The SN54ALS33A is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ALS33A is characterized for operation from 0°C to 70°C .

FUNCTION TABLE
(each gate)

INPUTS		OUTPUT
A	B	Y
H	X	L
X	H	L
L	L	H

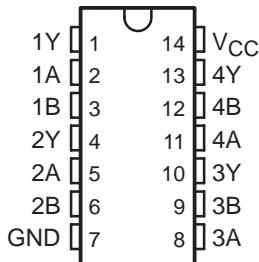
logic symbol†



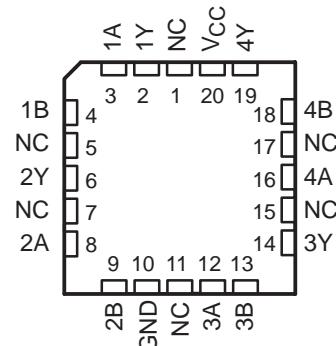
† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

Pin numbers shown are for the D, J, and N packages.

SN54ALS33A . . . J PACKAGE
SN74ALS33A . . . D OR N PACKAGE
(TOP VIEW)

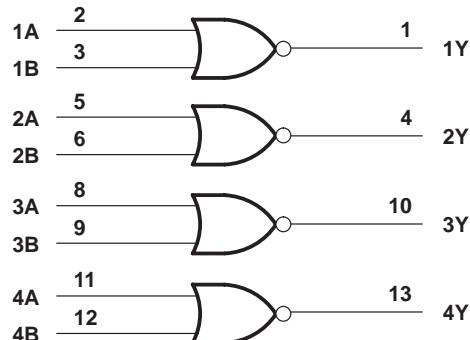


SN54ALS33A . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

logic diagram (positive logic)



**SN54ALS33A, SN74ALS33A
QUADRUPLE 2-INPUT POSITIVE-NOR BUFFERS
WITH OPEN-COLLECTOR OUTPUTS**

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absolute maximum ratings over operating free-air temperature range (unless otherwise noted)[†]

Supply voltage, V_{CC}	7 V
Input voltage, V_I	7 V
Off-state output voltage	7 V
Operating free-air temperature range, T_A : SN54ALS33A	-55°C to 125°C
SN74ALS33A	0°C to 70°C
Storage temperature range	-65°C to 150°C

[†] Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

recommended operating conditions

		SN54ALS33A			SN74ALS33A			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.5	5	5.5	V
V_{IH}	High-level input voltage	2			2			V
V_{IL}	Low-level input voltage		0.7			0.8		V
V_{OH}	High-level output voltage		5.5			5.5		V
I_{OL}	Low-level output current		12			24		mA
T_A	Operating free-air temperature	-55	125	0	0	70	70	°C

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS	SN54ALS33A			SN74ALS33A			UNIT
		MIN	TYP [‡]	MAX	MIN	TYP [‡]	MAX	
V_{IK}	$V_{CC} = 4.5$ V, $I_I = -18$ mA		-1.5			-1.5		V
V_{OL}	$V_{CC} = 4.5$ V	$I_{OL} = 12$ mA	0.25	0.4	0.25	0.4		V
		$I_{OL} = 24$ mA			0.35	0.5		
I_I	$V_{CC} = 5.5$ V, $V_I = 7$ V		0.1			0.1		mA
I_{IH}	$V_{CC} = 5.5$ V, $V_I = 2.7$ V		20			20		μA
I_{IL}	$V_{CC} = 5.5$ V, $V_I = 0.4$ V		-0.1			-0.1		mA
I_{OH}	$V_{CC} = 4.5$ V, $V_{OH} = 5.5$ V		0.1			0.1		mA
I_{CCH}	$V_{CC} = 5.5$ V, $V_I = 0$	1.7	2.8		1.7	2.8		mA
I_{CCL}	$V_{CC} = 5.5$ V, $V_I = 4.5$ V	5.6	9		5.6	9		mA

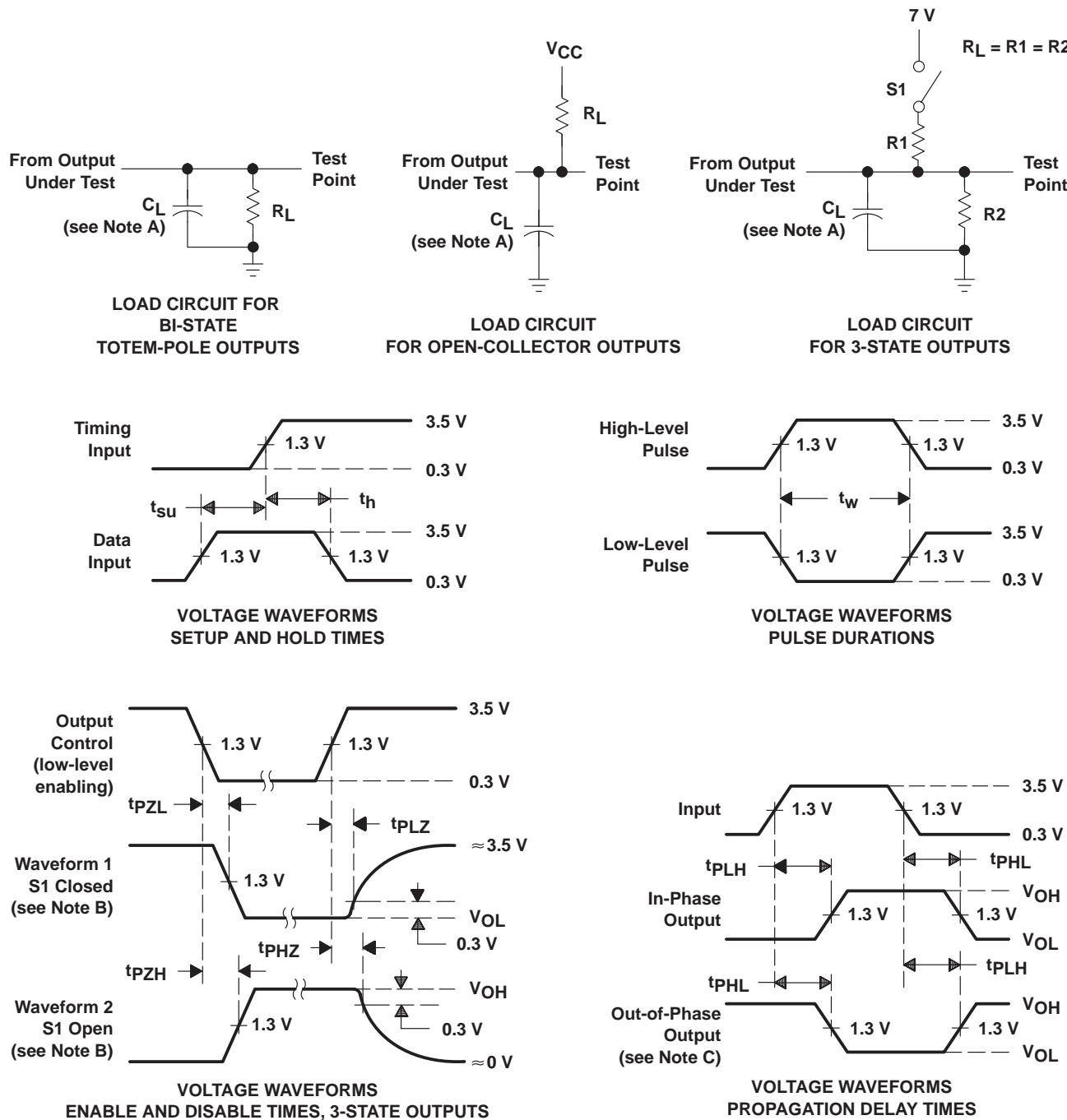
[‡] All typical values are at $V_{CC} = 5$ V, $T_A = 25$ °C.

switching characteristics (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 4.5$ V to 5.5 V, $C_L = 50$ pF, $R_L = 680$ Ω, $T_A = \text{MIN to MAX}^{\$}$				UNIT	
			SN54ALS33A		SN74ALS33A			
			MIN	MAX	MIN	MAX		
t_{PLH}	A or B	Y	10	59	10	33	ns	
			2	18	2	12		

[§] For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

**PARAMETER MEASUREMENT INFORMATION
 SERIES 54ALS/74ALS AND 54AS/74AS DEVICES**



NOTES: A. C_L includes probe and jig capacitance.
 B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
 C. When measuring propagation delay items of 3-state outputs, switch S1 is open.
 D. All input pulses have the following characteristics: $PRR \leq 1 \text{ MHz}$, $t_r = t_f = 2 \text{ ns}$, duty cycle = 50%.
 E. The outputs are measured one at a time with one transition per measurement.

Figure 1. Load Circuits and Voltage Waveforms

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
SN54ALS33AJ	Active	Production	CDIP (J) 14	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	SN54ALS33AJ
SN54ALS33AJ.A	Active	Production	CDIP (J) 14	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	SN54ALS33AJ

⁽¹⁾ **Status:** For more details on status, see our [product life cycle](#).

⁽²⁾ **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

⁽³⁾ **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

⁽⁴⁾ **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

⁽⁵⁾ **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

⁽⁶⁾ **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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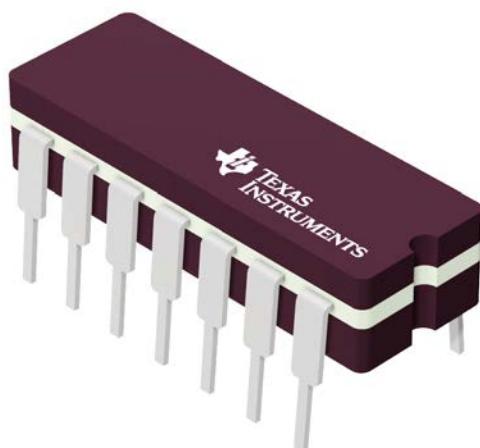
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GENERIC PACKAGE VIEW

J 14

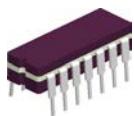
CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE



Images above are just a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.

4040083-5/G

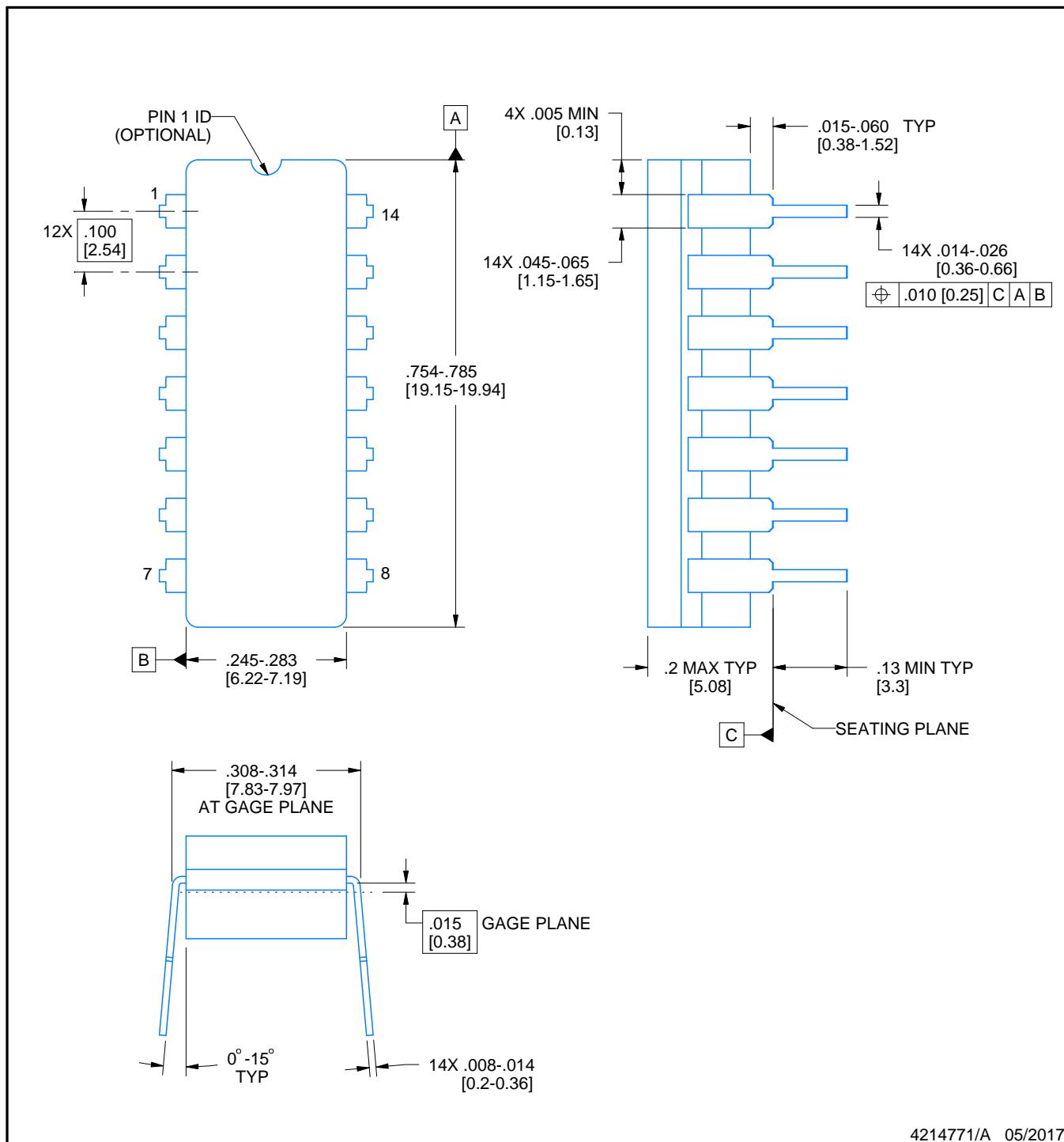


PACKAGE OUTLINE

J0014A

CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE



4214771/A 05/2017

NOTES:

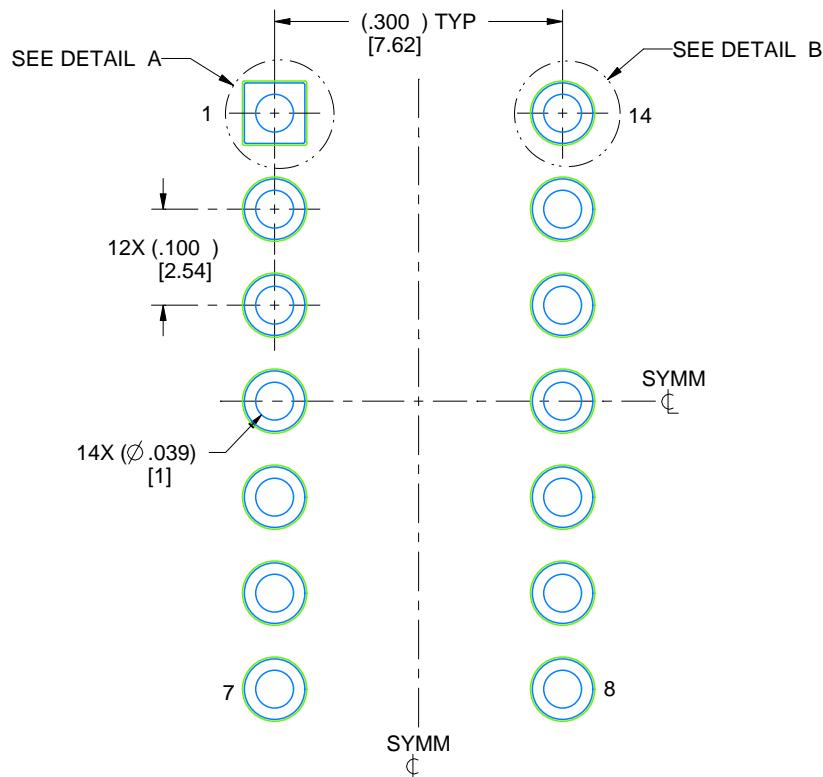
1. All controlling linear dimensions are in inches. Dimensions in brackets are in millimeters. Any dimension in brackets or parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This package is hermetically sealed with a ceramic lid using glass frit.
4. Index point is provided on cap for terminal identification only and on press ceramic glass frit seal only.
5. Falls within MIL-STD-1835 and GDIP1-T14.

EXAMPLE BOARD LAYOUT

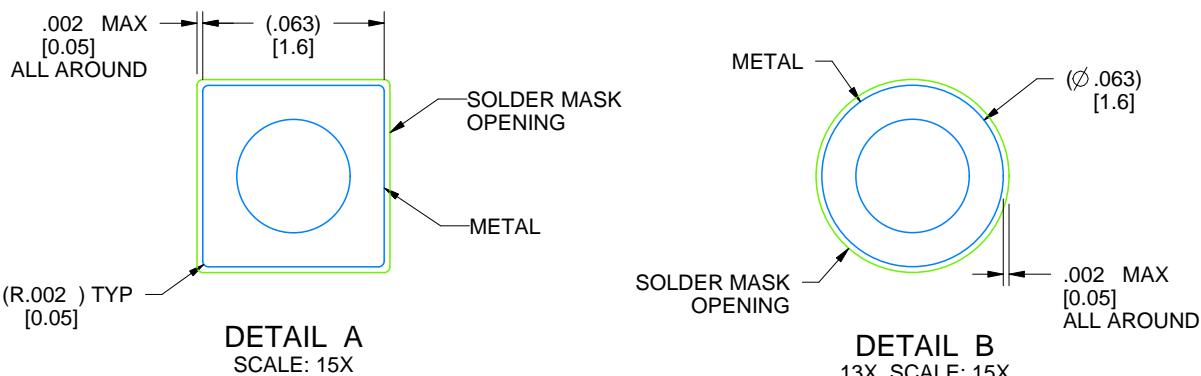
J0014A

CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE



LAND PATTERN EXAMPLE
NON-SOLDER MASK DEFINED
SCALE: 5X



4214771/A 05/2017

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