

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

description

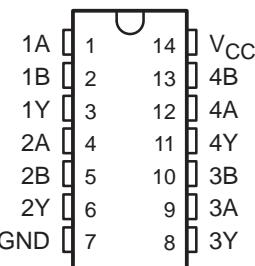
These devices contain four independent 2-input OR gates. They perform the Boolean functions $Y = A + B$ or $Y = \bar{A} \cdot \bar{B}$ in positive logic.

The SN54F32 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74F32 is characterized for operation from 0°C to 70°C .

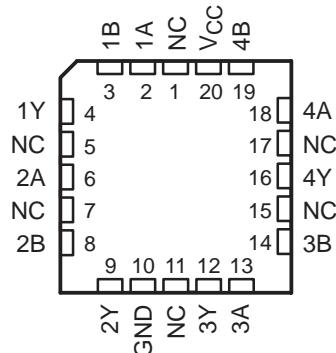
FUNCTION TABLE
(each gate)

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

SN54F32 . . . J PACKAGE
SN74F32 . . . D OR N PACKAGE
(TOP VIEW)

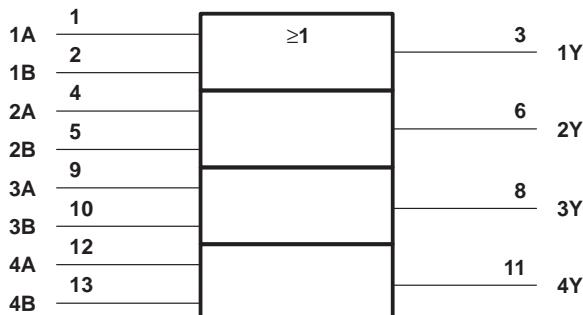


SN54F32 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

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.

logic diagram, each gate (positive logic)



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

SN54F32, SN74F32 QUADRUPLE 2-INPUT POSITIVE-OR GATES

SDFS044B – MARCH 1987 – REVISED MAY 1999

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

† 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.

NOTES: 1. The input voltage ratings may be exceeded provided the input current ratings are observed.
 2. The package thermal impedance is calculated in accordance with JEDEC 51, except for through-hole packages, which use a trace length of zero.

recommended operating conditions (see Note 3)

		SN54F32			SN74F32			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			0.8			0.8	V
I _{IK}	Input clamp current			-18			-18	mA
I _{OH}	High-level output current			-1			-1	mA
I _{OL}	Low-level output current			20			20	mA
T _A	Operating free-air temperature	-55		125	0		70	°C

NOTE 3: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

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

PARAMETER	TEST CONDITIONS	SN54F32			SN74F32			UNIT
		MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IK}	$V_{CC} = 4.5 \text{ V}$, $I_I = -18 \text{ mA}$			-1.2			-1.2	V
V_{OH}	$V_{CC} = 4.5 \text{ V}$, $I_{OH} = -1 \text{ mA}$	2.5	3.4		2.5	3.4		V
	$V_{CC} = 4.75 \text{ V}$, $I_{OH} = -1 \text{ mA}$				2.7			
V_{OL}	$V_{CC} = 4.5 \text{ V}$, $I_{OL} = 20 \text{ mA}$		0.3	0.5		0.3	0.5	V
I_I	$V_{CC} = 5.5 \text{ V}$, $V_I = 7 \text{ V}$			0.1			0.1	mA
I_{IH}	$V_{CC} = 5.5 \text{ V}$, $V_I = 2.7 \text{ V}$			20			20	μA
I_{IL}	$V_{CC} = 5.5 \text{ V}$, $V_I = 0.5 \text{ V}$			-0.6			-0.6	mA
$I_{OS}^§$	$V_{CC} = 5.5 \text{ V}$, $V_O = 0$	-60		-150	-60		-150	mA
$I_{CCH}^¶$	$V_{CC} = 5.5 \text{ V}$		6.1	9.2		6.1	9.2	mA
I_{CCL}	$V_{CC} = 5.5 \text{ V}$, $V_I = 0$		10.3	15.5		10.3	15.5	mA

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

§ Not more than one output should be shorted at a time, and the duration of the short circuit should not exceed one second.

¶ Not more than one output should be shorted at a time, and the duration of the short should not exceed 10 s.

SN54F32, SN74F32
QUADRUPLE 2-INPUT POSITIVE-OR GATES

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switching characteristics over recommended operating free-air temperature range (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 5 V, T _A = 25°C			SN54F32		SN74F32		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t _{PLH}	A or B	Y	2.2	3.8	5.6	2.2	7.5	2.2	6.6	ns
t _{PHL}			2.2	3.6	5.3	1.7	7.5	2.2	6.3	

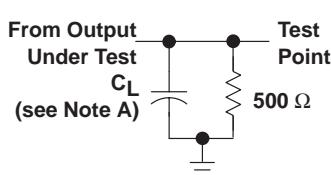


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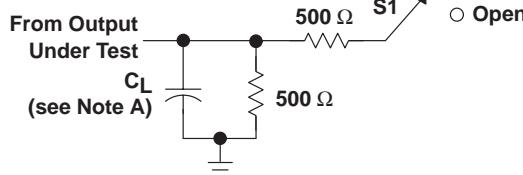
SN54F32, SN74F32 QUADRUPLE 2-INPUT POSITIVE-OR GATES

SDFS044B – MARCH 1987 – REVISED MAY 1999

PARAMETER MEASUREMENT INFORMATION

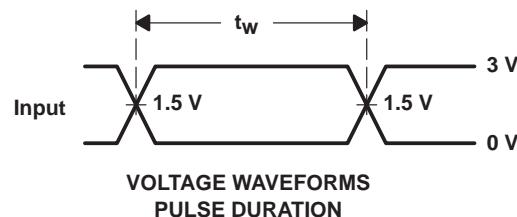


LOAD CIRCUIT FOR
TOTEM-POLE OUTPUTS

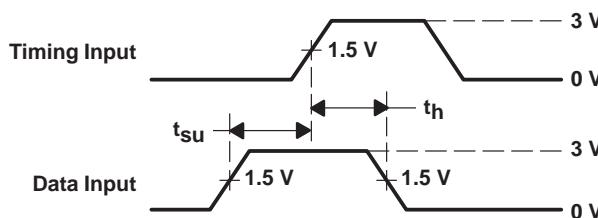


LOAD CIRCUIT FOR
3-STATE AND OPEN-DRAIN OUTPUTS

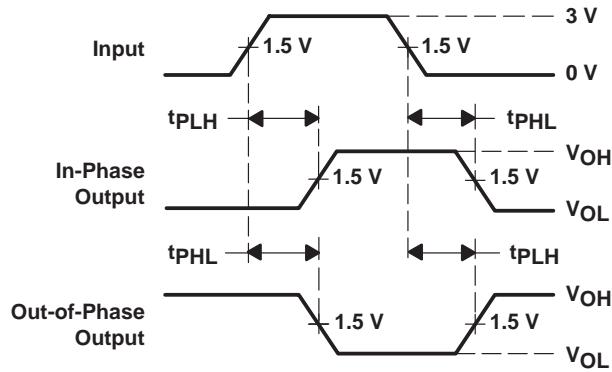
TEST	S1
tPLH/tPHL	Open
tPLZ/tPZL	7 V
tPHZ/tPZH	Open
Open Collector	7 V



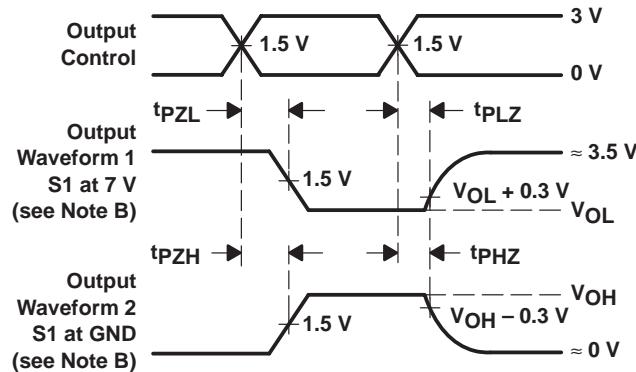
VOLTAGE WAVEFORMS
PULSE DURATION



VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES
INVERTING AND NONINVERTING OUTPUTS



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES
LOW- AND HIGH-LEVEL ENABLING

NOTES:

- C_L includes probe and jig capacitance.
- 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.
- All input pulses are supplied by generators having the following characteristics: $PRR \leq 1 \text{ MHz}$, $Z_O = 50 \Omega$, $t_r \leq 2.5 \text{ ns}$, $t_f \leq 2.5 \text{ ns}$, duty cycle = 50%.
- The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit 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)
5962-9758801Q2A	Active	Production	LCCC (FK) 20	55 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9758801Q2A SNJ54F 32FK
5962-9758801QCA	Active	Production	CDIP (J) 14	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9758801QC A SNJ54F32J
5962-9758801QDA	Active	Production	CFP (W) 14	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9758801QD A SNJ54F32W
SN54F32J	Active	Production	CDIP (J) 14	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	SN54F32J
SN54F32J.A	Active	Production	CDIP (J) 14	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	SN54F32J
SN74F32D	Obsolete	Production	SOIC (D) 14	-	-	Call TI	Call TI	0 to 70	F32
SN74F32DR	Active	Production	SOIC (D) 14	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	F32
SN74F32DR.A	Active	Production	SOIC (D) 14	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	F32
SN74F32DRE4	Active	Production	SOIC (D) 14	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	F32
SN74F32DRG4	Active	Production	SOIC (D) 14	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	F32
SN74F32N	Active	Production	PDIP (N) 14	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN74F32N
SN74F32N.A	Active	Production	PDIP (N) 14	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN74F32N
SN74F32NE4	Active	Production	PDIP (N) 14	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN74F32N
SN74F32NSR	Active	Production	SOP (NS) 14	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	74F32
SN74F32NSR.A	Active	Production	SOP (NS) 14	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	74F32
SNJ54F32FK	Active	Production	LCCC (FK) 20	55 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9758801Q2A SNJ54F 32FK
SNJ54F32FK.A	Active	Production	LCCC (FK) 20	55 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9758801Q2A SNJ54F 32FK
SNJ54F32J	Active	Production	CDIP (J) 14	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9758801QC A SNJ54F32J

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)
SNJ54F32J.A	Active	Production	CDIP (J) 14	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9758801QC A SNJ54F32J
SNJ54F32W	Active	Production	CFP (W) 14	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9758801QD A SNJ54F32W
SNJ54F32W.A	Active	Production	CFP (W) 14	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9758801QD A SNJ54F32W

⁽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.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

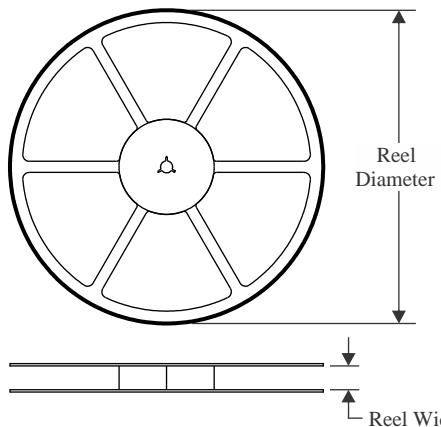
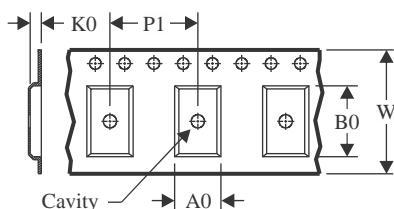
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

OTHER QUALIFIED VERSIONS OF SN54F32, SN74F32 :

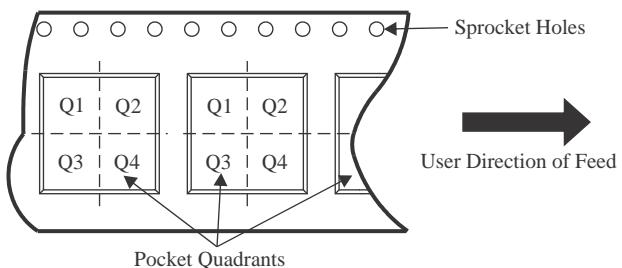
- Catalog : [SN74F32](#)
- Military : [SN54F32](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications

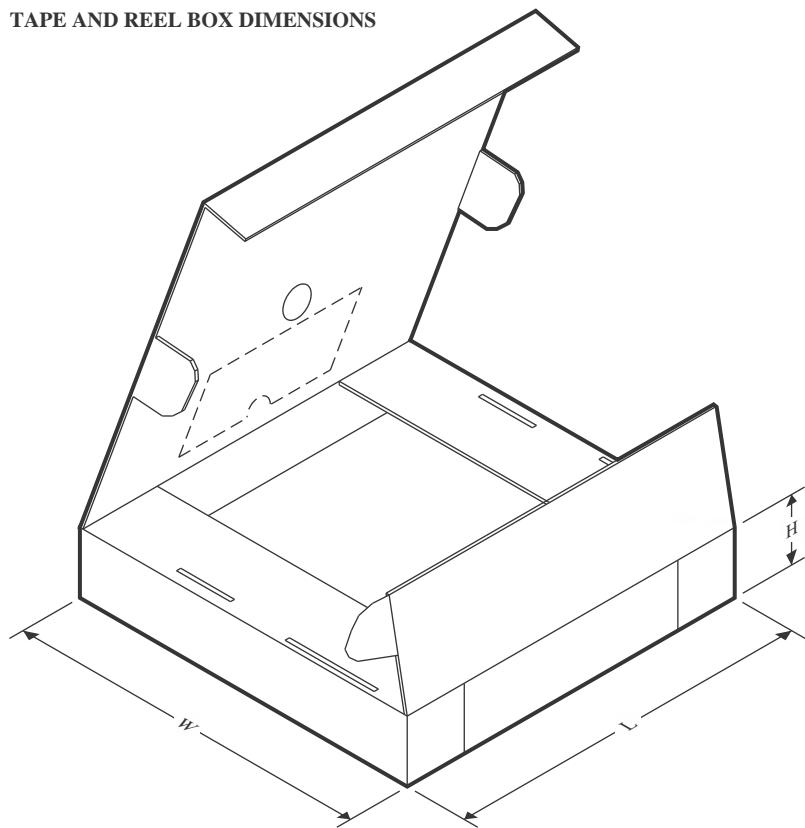
TAPE AND REEL INFORMATION
REEL DIMENSIONS

TAPE DIMENSIONS


A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE


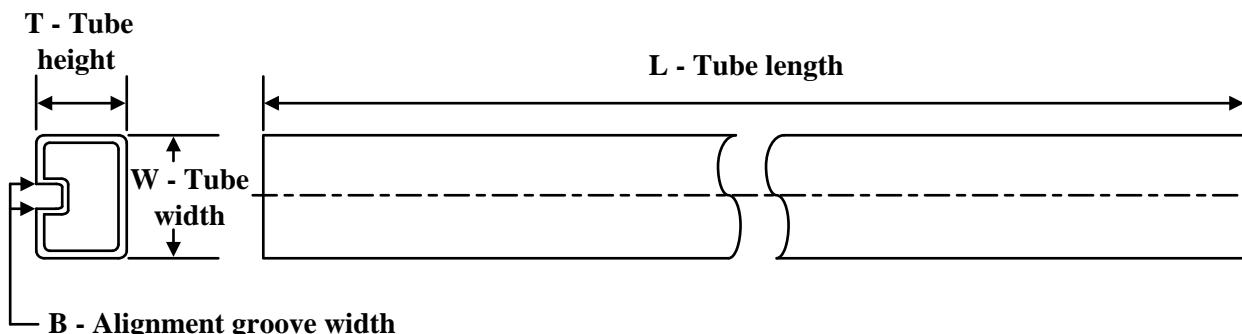
*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74F32DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74F32NSR	SOP	NS	14	2000	330.0	16.4	8.1	10.4	2.5	12.0	16.0	Q1

TAPE AND REEL BOX DIMENSIONS


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74F32DR	SOIC	D	14	2500	353.0	353.0	32.0
SN74F32NSR	SOP	NS	14	2000	353.0	353.0	32.0

TUBE


*All dimensions are nominal

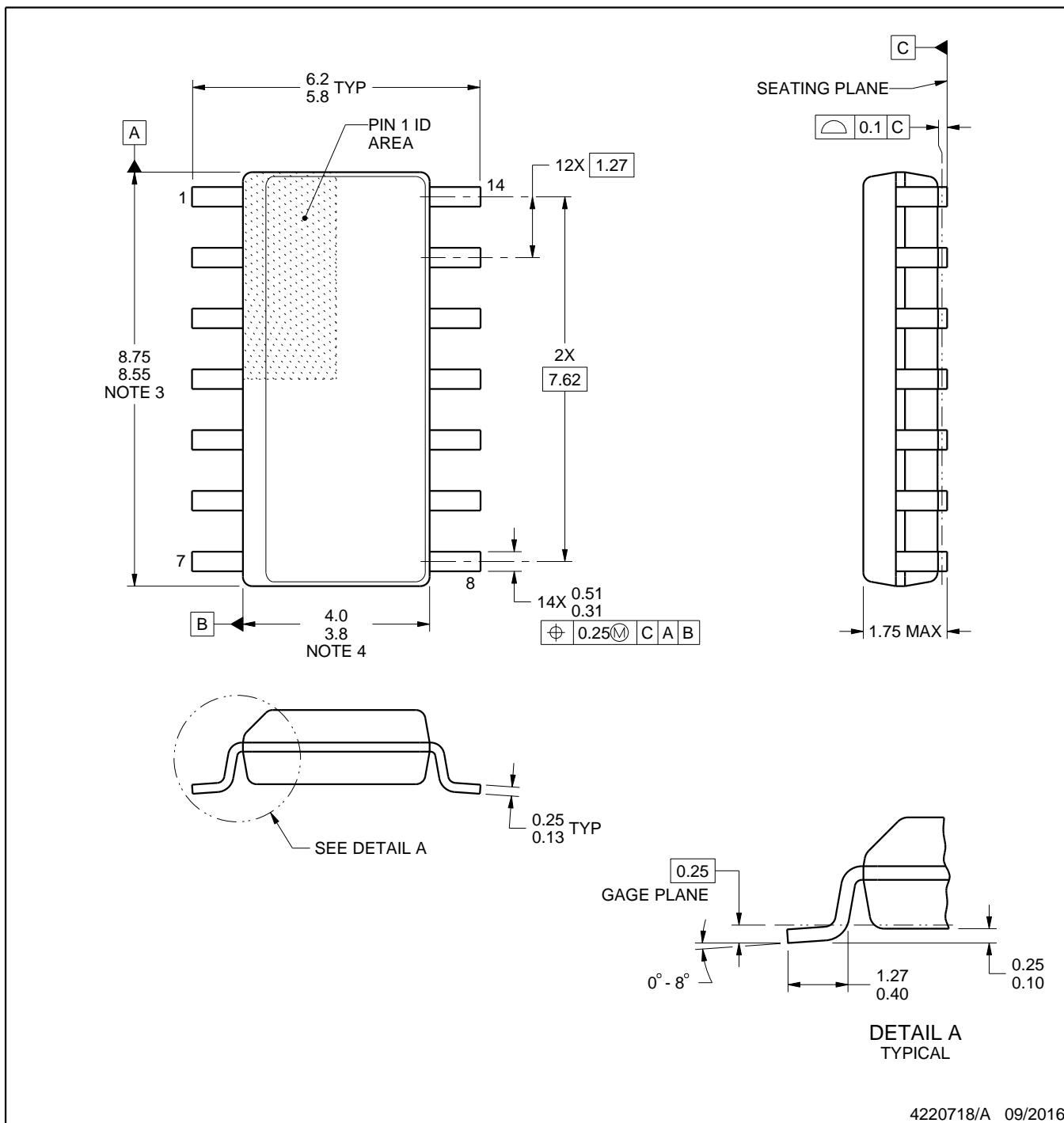
Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
5962-9758801Q2A	FK	LCCC	20	55	506.98	12.06	2030	NA
5962-9758801QDA	W	CFP	14	25	506.98	26.16	6220	NA
SN74F32N	N	PDIP	14	25	506	13.97	11230	4.32
SN74F32N	N	PDIP	14	25	506	13.97	11230	4.32
SN74F32N.A	N	PDIP	14	25	506	13.97	11230	4.32
SN74F32N.A	N	PDIP	14	25	506	13.97	11230	4.32
SN74F32NE4	N	PDIP	14	25	506	13.97	11230	4.32
SN74F32NE4	N	PDIP	14	25	506	13.97	11230	4.32
SNJ54F32FK	FK	LCCC	20	55	506.98	12.06	2030	NA
SNJ54F32FK.A	FK	LCCC	20	55	506.98	12.06	2030	NA
SNJ54F32W	W	CFP	14	25	506.98	26.16	6220	NA
SNJ54F32W.A	W	CFP	14	25	506.98	26.16	6220	NA

PACKAGE OUTLINE

D0014A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



4220718/A 09/2016

NOTES:

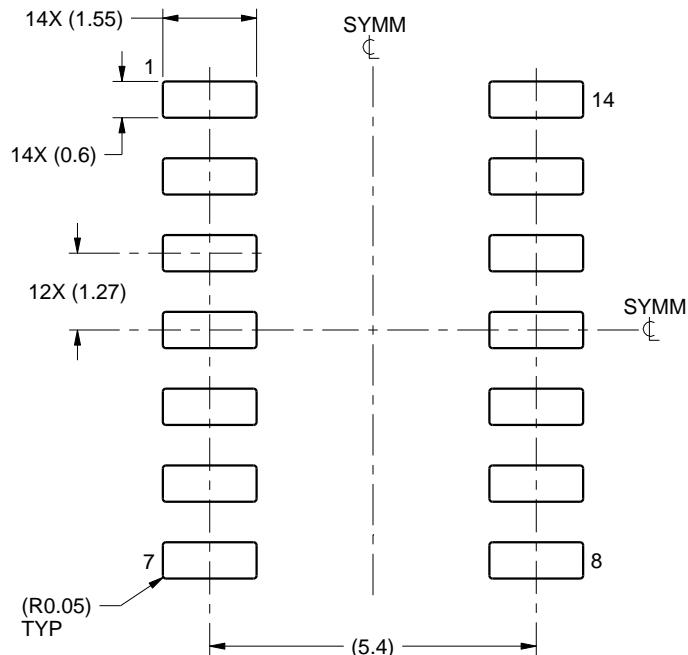
1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm, per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.43 mm, per side.
5. Reference JEDEC registration MS-012, variation AB.

EXAMPLE BOARD LAYOUT

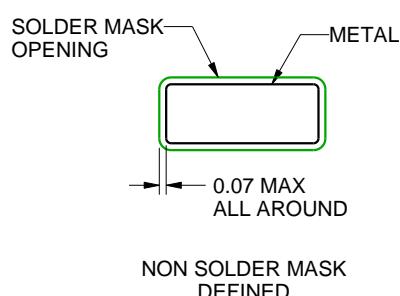
D0014A

SOIC - 1.75 mm max height

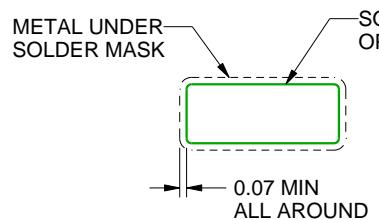
SMALL OUTLINE INTEGRATED CIRCUIT



LAND PATTERN EXAMPLE
SCALE:8X



NON SOLDER MASK
DEFINED



SOLDER MASK
DEFINED

SOLDER MASK DETAILS

4220718/A 09/2016

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

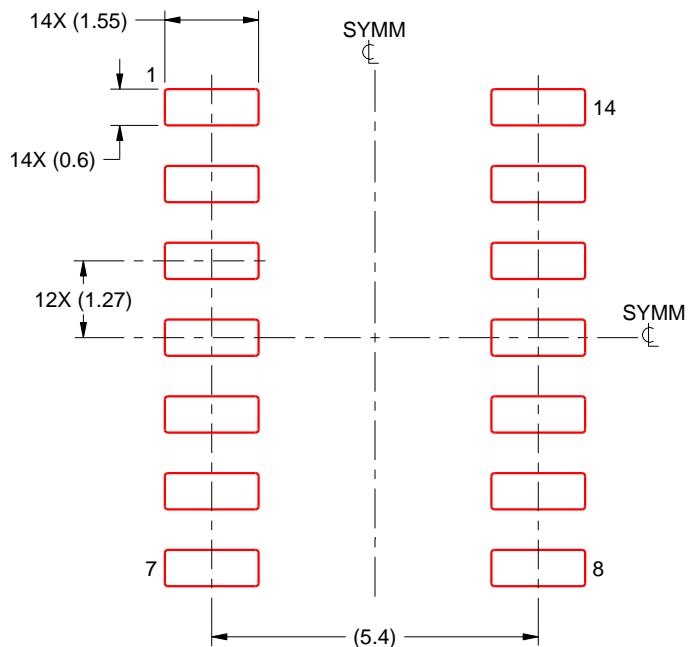
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

D0014A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:8X

4220718/A 09/2016

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

MECHANICAL DATA

NS (R-PDSO-G)**

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN

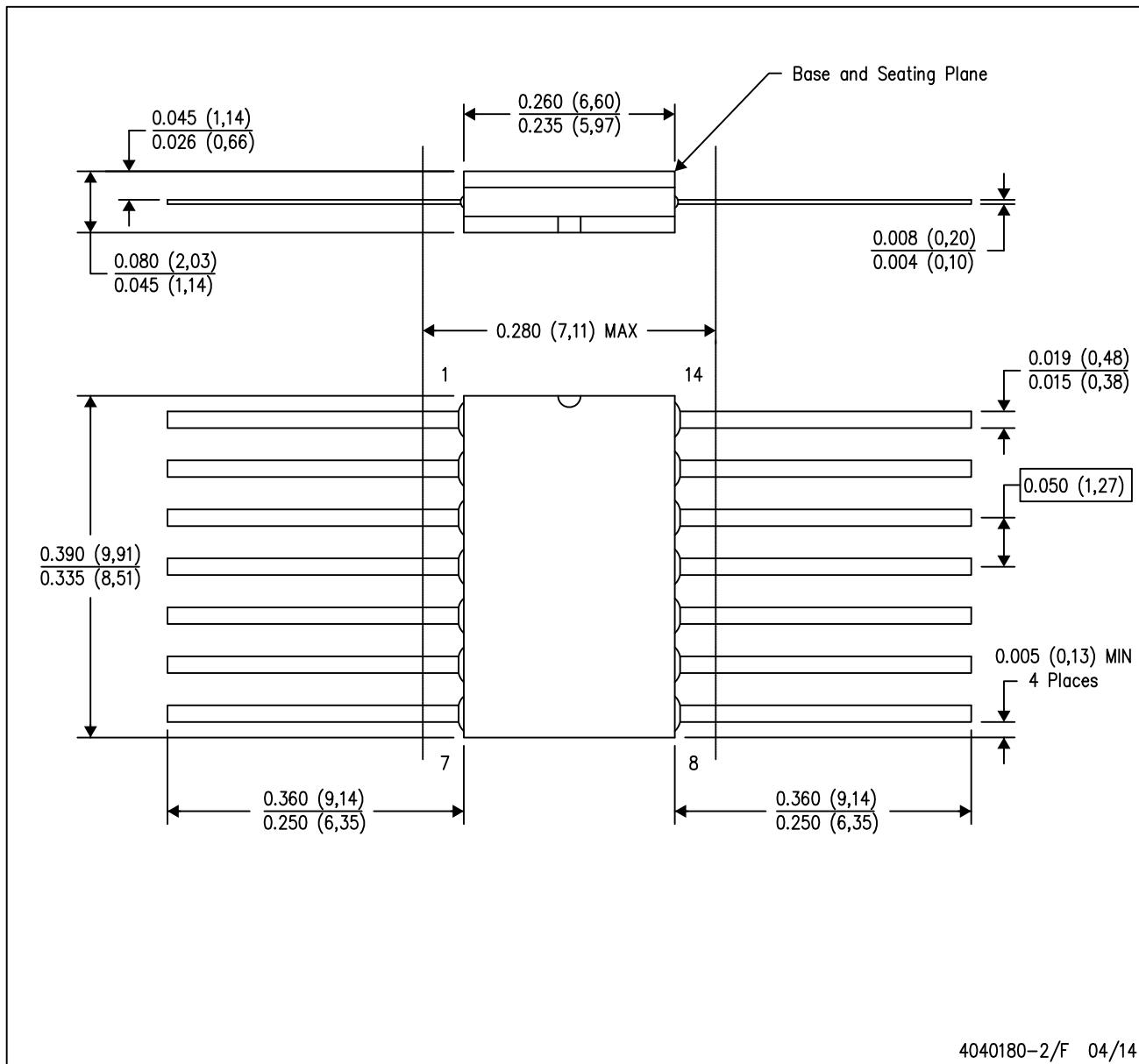


NOTES:

- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

W (R-GDFP-F14)

CERAMIC DUAL FLATPACK



NOTES:

- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. This package can be hermetically sealed with a ceramic lid using glass frit.
- D. Index point is provided on cap for terminal identification only.
- E. Falls within MIL-STD 1835 GDFP1-F14

GENERIC PACKAGE VIEW

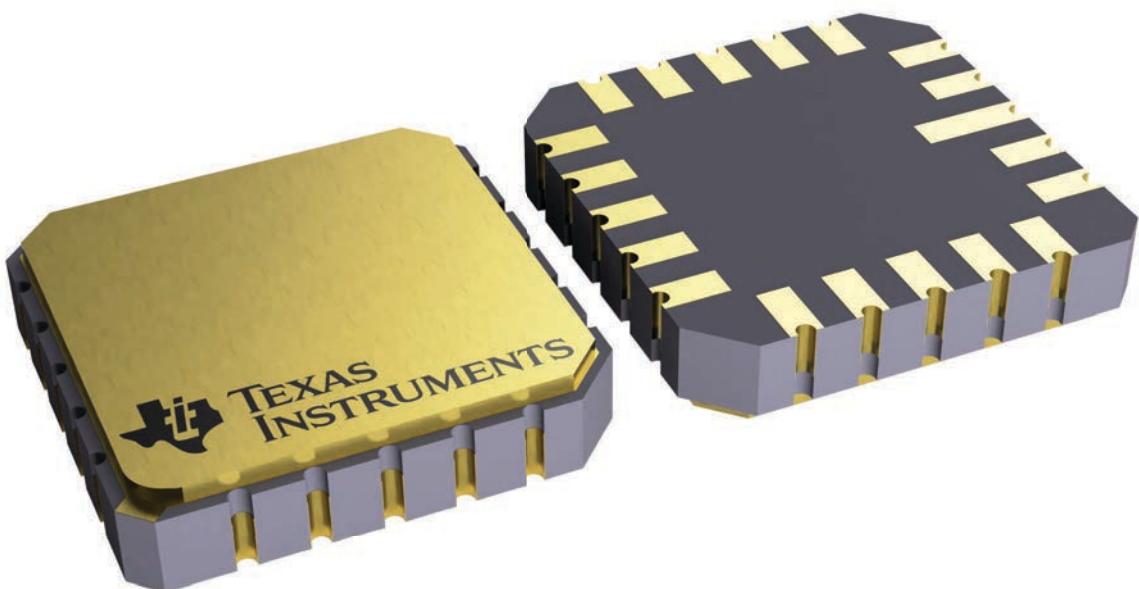
FK 20

LCCC - 2.03 mm max height

8.89 x 8.89, 1.27 mm pitch

LEADLESS CERAMIC CHIP CARRIER

This image is a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.



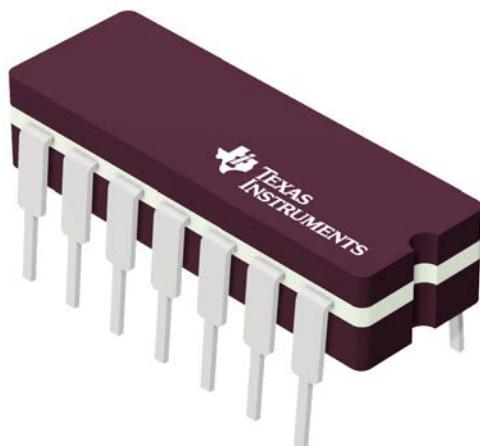
4229370VA\

GENERIC PACKAGE VIEW

J 14

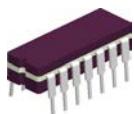
CDIP - 5.08 mm max height

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

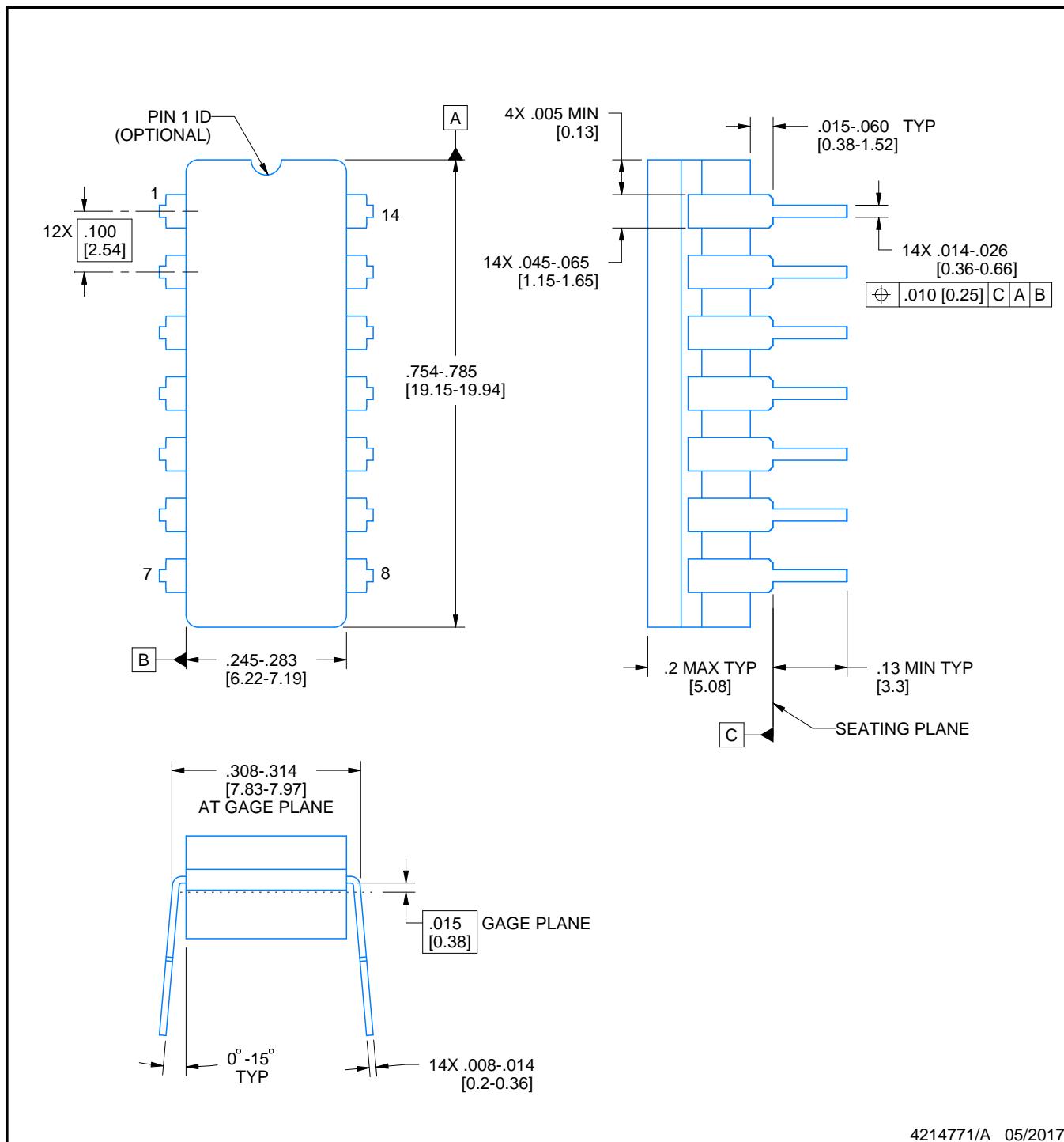


PACKAGE OUTLINE

J0014A

CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE



4214771/A 05/2017

NOTES:

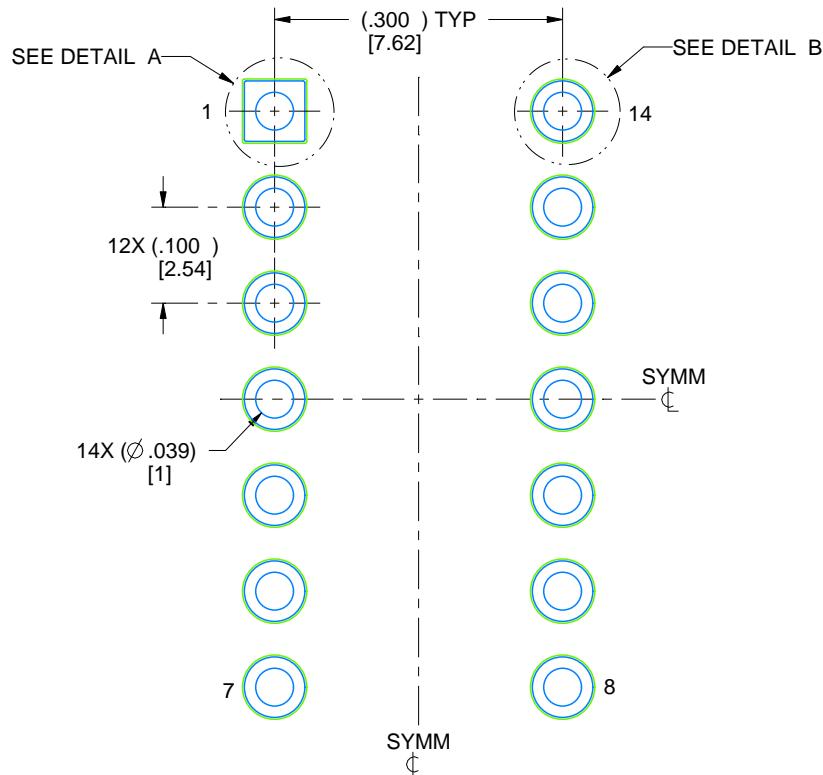
1. All controlling linear dimensions are in inches. Dimensions in brackets are in millimeters. Any dimension in brackets or parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This package is hermetically sealed with 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

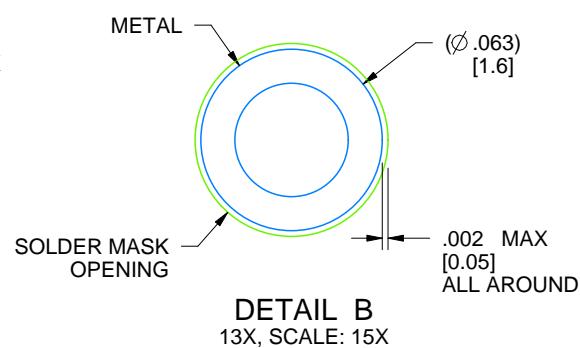
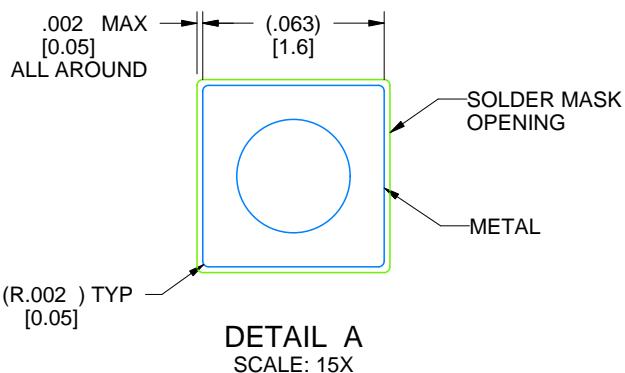
J0014A

CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE



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



4214771/A 05/2017

N (R-PDIP-T**)

16 PINS SHOWN

PLASTIC DUAL-IN-LINE PACKAGE



NOTES: A. All linear dimensions are in inches (millimeters).
 B. This drawing is subject to change without notice.

C. Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).

D. The 20 pin end lead shoulder width is a vendor option, either half or full width.

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