

# CD4041UB Types

## CMOS Quad True/Complement Buffer

### High Voltage Types (20-Volt Rating)

■ CD4041UB types are quad true/complement buffers consisting of n- and p-channel units having low channel resistance and high current (sourcing and sinking) capability. The CD4041UB is intended for use as a buffer, line driver, or CMOS-to-TTL driver. It can be used as an ultra-low power resistor-network driver for A/D and D/A conversion, as a transmission-line driver, and in other applications where high noise immunity and low power dissipation are primary design requirements.

The CD4041UB types are supplied in 14-lead hermetic dual-in-line ceramic packages (F3A suffix), 14-lead dual-in-line plastic packages (E suffix), 14-lead small-outline packages (M, MT, M96, and NSR suffixes), and 14-lead thin shrink small-outline packages (PW and PWR suffixes).

#### MAXIMUM RATINGS, Absolute-Maximum Values:

DC SUPPLY-VOLTAGE RANGE, ( $V_{DD}$ )	Voltages referenced to $V_{SS}$ Terminal) .....		-0.5V to +20V
INPUT VOLTAGE RANGE, ALL INPUTS	.....		-0.5V to $V_{DD} + 0.5V$
DC INPUT CURRENT, ANY ONE INPUT	.....		$\pm 10mA$
POWER DISSIPATION PER PACKAGE ( $P_D$ ):	For $T_A = -55^\circ C$ to $+100^\circ C$ .....		500mW
	For $T_A = +100^\circ C$ to $+125^\circ C$ .....		Derate Linearity at 12mW/ $^\circ C$ to 200mW
DEVICE DISSIPATION PER OUTPUT TRANSISTOR	FOR $T_A =$ FULL PACKAGE-TEMPERATURE RANGE (All Package Types) .....		100mW
OPERATING-TEMPERATURE RANGE ( $T_A$ )	.....		$-55^\circ C$ to $+125^\circ C$
STORAGE TEMPERATURE RANGE ( $T_{stg}$ )	.....		$-65^\circ C$ to $+150^\circ C$
LEAD TEMPERATURE (DURING SOLDERING):	At distance $1/16 \pm 1/32$ inch ( $1.59 \pm 0.79mm$ ) from case for 10s max .....		$+265^\circ C$

#### RECOMMENDED OPERATING CONDITIONS

For maximum reliability, nominal operating conditions should be selected so that operation is always within the following range:

CHARACTERISTIC	LIMITS		UNITS
	Min.	Max.	
Supply-Voltage Range (For $T_A$ =Full Package-Temperature Range)	3	18	V

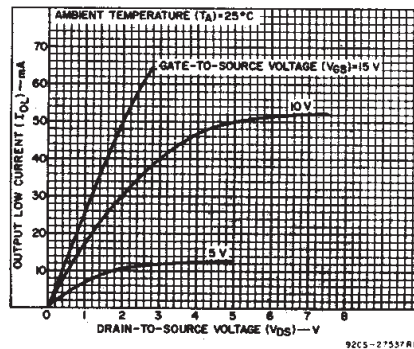


Fig. 2 – Typical output low (sink) current characteristics.

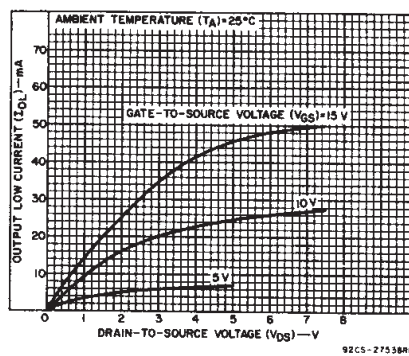


Fig. 3 – Minimum low (sink) current characteristics.

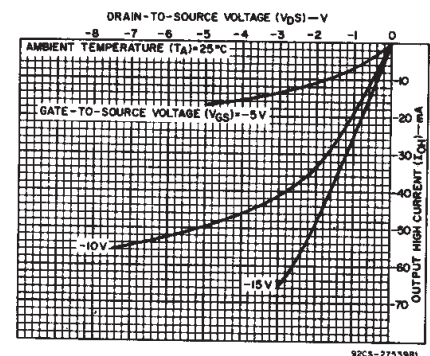


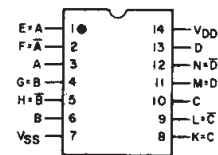
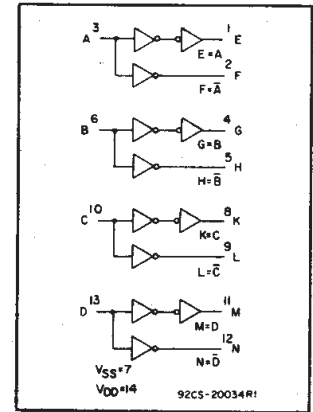
Fig. 4 – Typical output high (source) current characteristics.

#### Features:

- Balanced sink and source current; approximately 4 times standard "B" drive
- Equalized delay to true and complement outputs
- 100% tested for quiescent current at 20 V
- Maximum input current of 1  $\mu A$  at 18 V over full package temperature range; 100 nA at 18 V and 25 $^\circ C$
- 5-V, 10-V, and 15-V parametric ratings
- Meets all requirements of JEDEC Tentative Standard No. 13B, "Standard Specifications for Description of 'B' Series CMOS Devices"

#### Applications:

- High current source/sink driver
- CMOS-to-DTL/TTL Converter Buffer
- Display driver
- MOS clock driver
- Resistor network driver (Ladder or weighted R)
- Buffer
- Transmission line driver



92CS-20755R1

#### TOP VIEW TERMINAL ASSIGNMENT

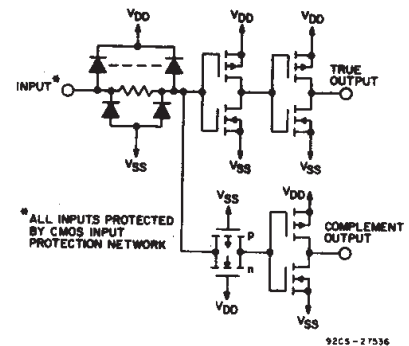


Fig. 1 – Schematic diagram 1 of 4 buffers.

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# CD4041UB Types

## STATIC ELECTRICAL CHARACTERISTICS

CHARACTERISTIC	CONDITIONS			LIMITS AT INDICATED TEMPERATURES (°C)							UNITS
	V <sub>O</sub> (V)	V <sub>IN</sub> (V)	V <sub>DD</sub> (V)	-55	-40	+85	+125	+25			
								Min.	Typ.	Max.	
Quiescent Device Current I <sub>DD</sub> Max.	—	0.5	5	1	1	30	30	—	0.02	1	μA
	—	0.10	10	2	2	60	60	—	0.02	2	
	—	0.15	15	4	4	120	120	—	0.02	4	
	—	0.20	20	20	20	600	600	—	0.04	20	
Output Low (Sink) Current, I <sub>OL</sub> Min.	0.4	0.5	5	2.1	1.8	1.3	1.2	1.6	3.2	—	mA
	0.5	0.10	10	6.25	5.6	4	3.5	5	10	—	
	1.5	0.15	15	24	23	15.5	13	19	38	—	
	4.6	0.5	5	-2.1	-1.8	-1.3	-1.2	-1.6	-3.2	—	
Output High (Source) Current, I <sub>OH</sub> Min.	2.5	0.5	5	-8.4	-6.7	-5.3	-4.6	-6.4	-12.8	—	mA
	9.5	0.10	10	-6.25	-5.6	-4	-3.5	-5	-10	—	
	13.5	0.15	15	-24	-23	-15.5	-13	-19	-38	—	
Output Voltage: Low-Level, V <sub>OL</sub> Max.	—	0.5	5	0.05				—	0	0.05	V
	—	0.10	10	0.05				—	0	0.05	
	—	0.15	15	0.05				—	0	0.05	
Output Voltage: High-Level, V <sub>OH</sub> Min.	—	0.5	5	4.95				4.95	5	—	V
	—	0.10	10	9.95				9.95	10	—	
	—	0.15	15	14.95				14.95	15	—	
Input Low Voltage, V <sub>IL</sub> Max.	0.5, 4.5	—	5	1				—	—	1	V
	1.9	—	10	2				—	—	2	
	1.5, 13.5	—	15	2.5				—	—	2.5	
Input High Voltage, V <sub>IH</sub> Min.	0.5, 4.5	—	5	4				4	—	—	V
	1.9	—	10	8				8	—	—	
	1.5, 13.5	—	15	12.5				12.5	—	—	
Input Current, I <sub>IN</sub> Max.	—	0.18	18	±0.1	±0.1	±1	±1	—	±10 <sup>-5</sup>	±0.1	μA

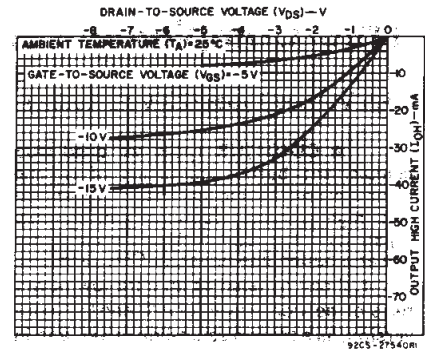


Fig. 5 - Minimum output high (source) current characteristics.

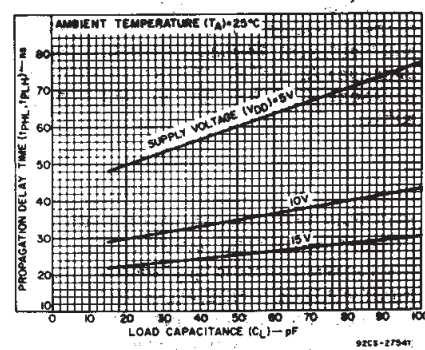


Fig. 6 - Typical propagation delay time vs. load capacitance.

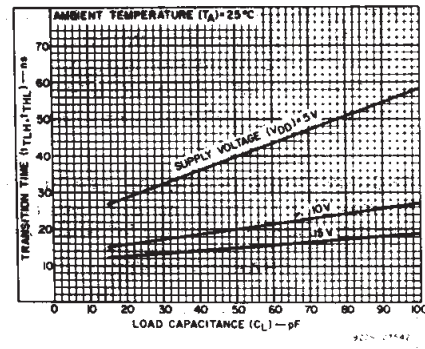


Fig. 7 - Typical transition time vs. load capacitance.

DYNAMIC ELECTRICAL CHARACTERISTICS at T<sub>A</sub> = 25°C, Input t<sub>r</sub>, t<sub>f</sub> = 20 ns, C<sub>L</sub> = 50 pF, R<sub>L</sub> = 200 kΩ

CHARACTERISTIC		CONDITIONS		LIMITS		UNITS
		V <sub>DD</sub> Volts	Typ.	Max.		
Propagation Delay Time:	t <sub>PHL</sub>	5	60	120	ns	
	t <sub>PLH</sub>	10	35	70		
	t <sub>PLH</sub>	15	25	50		
Transition Time	t <sub>THL</sub>	5	40	80	ns	
	t <sub>TLH</sub>	10	20	40		
	t <sub>TLH</sub>	15	15	30		
Input Capacitance	C <sub>IN</sub>	Any Input	15	22.5	pF	

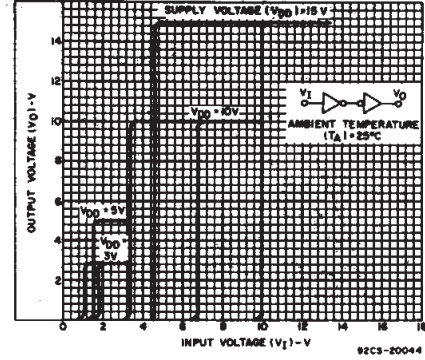


Fig. 8 - Minimum and maximum transfer characteristics - true output.

# CD4041UB Types

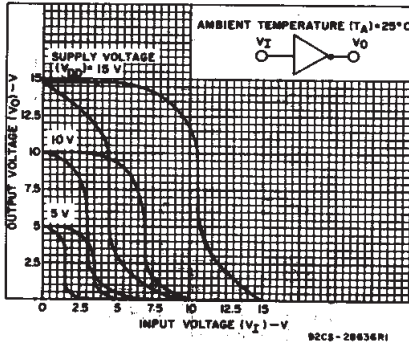


Fig. 9 - Minimum and maximum transfer characteristics - complement output.

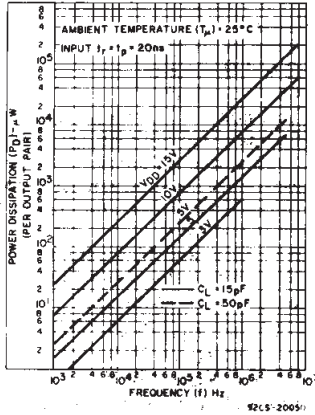


Fig. 11 - Typical power dissipation vs frequency per output pair.

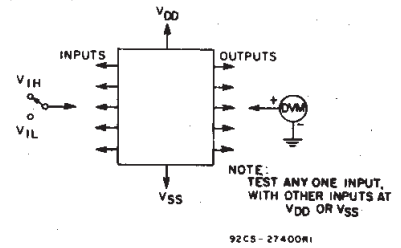


Fig. 13 - Input voltage test circuit.

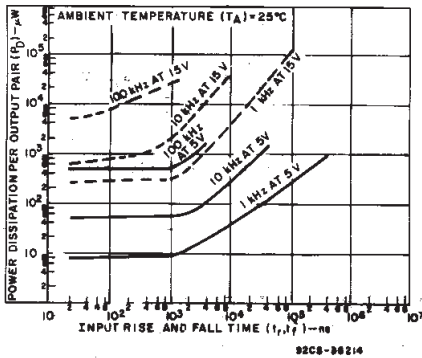


Fig. 10 - Typical power dissipation vs. input rise & fall time per output pair.

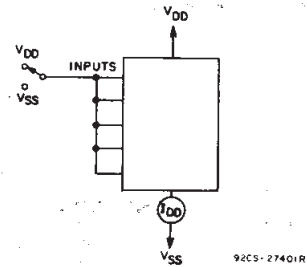


Fig. 12 - Quiescent device current test circuit.

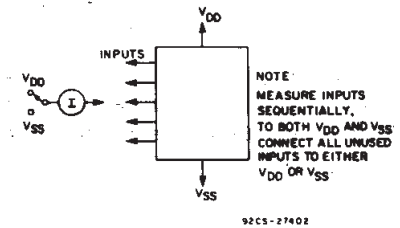
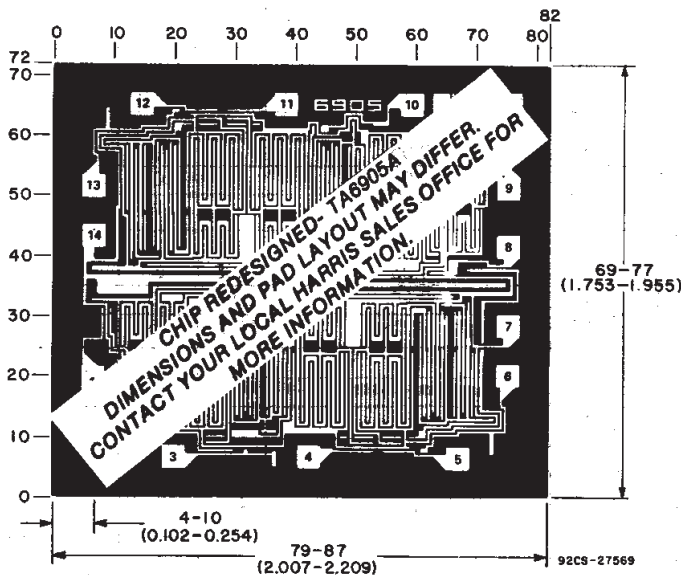


Fig. 14 - Input-leakage-current test circuit.

## Dimensions and pad layout for the CD4041UBH



Dimensions in parentheses are in millimeters and are derived from the basic inch dimensions as indicated. Grid graduations are in mils ( $10^{-3}$  inch).

3  
COMMERCIAL CMOS  
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**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)
<a href="#">CD4041UBE</a>	Active	Production	PDIP (N)   14	25   TUBE	Yes	NIPDAU	N/A for Pkg Type	-55 to 125	CD4041UBE
CD4041UBE.A	Active	Production	PDIP (N)   14	25   TUBE	Yes	NIPDAU	N/A for Pkg Type	-55 to 125	CD4041UBE
<a href="#">CD4041UBF</a>	Active	Production	CDIP (J)   14	25   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	CD4041UBF
CD4041UBF.A	Active	Production	CDIP (J)   14	25   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	CD4041UBF
<a href="#">CD4041UBF3A</a>	Active	Production	CDIP (J)   14	25   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	CD4041UBF3A
CD4041UBF3A.A	Active	Production	CDIP (J)   14	25   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	CD4041UBF3A
<a href="#">CD4041UBM</a>	Obsolete	Production	SOIC (D)   14	-	-	Call TI	Call TI	-55 to 125	CD4041UBM
<a href="#">CD4041UBM96</a>	Active	Production	SOIC (D)   14	2500   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	CD4041UBM
CD4041UBM96.A	Active	Production	SOIC (D)   14	2500   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	CD4041UBM
<a href="#">CD4041UBMT</a>	Obsolete	Production	SOIC (D)   14	-	-	Call TI	Call TI	-55 to 125	CD4041UBM
<a href="#">CD4041UBPW</a>	Obsolete	Production	TSSOP (PW)   14	-	-	Call TI	Call TI	-55 to 125	CM041UB
<a href="#">CD4041UBPWR</a>	Active	Production	TSSOP (PW)   14	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM041UB
CD4041UBPWR.A	Active	Production	TSSOP (PW)   14	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM041UB

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

<sup>(2)</sup> **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.

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

<sup>(4)</sup> **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.

<sup>(5)</sup> **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.

<sup>(6)</sup> **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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**OTHER QUALIFIED VERSIONS OF CD4041UB, CD4041UB-MIL :**

- Catalog : [CD4041UB](#)
- Military : [CD4041UB-MIL](#)

NOTE: Qualified Version Definitions:

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

**TAPE AND REEL INFORMATION**

**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
CD4041UBM96	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
CD4041UBPWR	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1

**TAPE AND REEL BOX DIMENSIONS**


\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
CD4041UBM96	SOIC	D	14	2500	353.0	353.0	32.0
CD4041UBPWR	TSSOP	PW	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)
CD4041UBE	N	PDIP	14	25	506	13.97	11230	4.32
CD4041UBE	N	PDIP	14	25	506	13.97	11230	4.32
CD4041UBE.A	N	PDIP	14	25	506	13.97	11230	4.32
CD4041UBE.A	N	PDIP	14	25	506	13.97	11230	4.32





# D0014A

# PACKAGE OUTLINE

## SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



### 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



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.

J 14

**GENERIC PACKAGE VIEW**  
**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

J0014A



# PACKAGE OUTLINE

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\*\*)

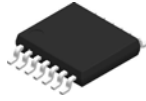
PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
  - The 20 pin end lead shoulder width is a vendor option, either half or full width.

PW0014A



**PACKAGE OUTLINE**  
**TSSOP - 1.2 mm max height**

SMALL OUTLINE PACKAGE



4220202/B 12/2023

NOTES:

1. All linear dimensions are in millimeters. Any 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 0.25 mm per side.
5. Reference JEDEC registration MO-153.



# EXAMPLE BOARD LAYOUT

PW0014A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE: 10X



SOLDER MASK DETAILS

4220202/B 12/2023

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

PW0014A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE: 10X

4220202/B 12/2023

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.

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