

SN74AUP1T17 Low Power, 1.8/2.5/3.3-V Input, 3.3-V CMOS Output, Single Schmitt-Trigger Buffer Gate

1 Features

- Single-Supply Voltage Translator
- Output Level Up to Supply V_{CC} CMOS Level
 - 1.8 V to 3.3 V (at $V_{CC} = 3.3$ V)
 - 2.5 V to 3.3 V (at $V_{CC} = 3.3$ V)
 - 1.8 V to 2.5 V (at $V_{CC} = 2.5$ V)
 - 3.3 V to 2.5 V (at $V_{CC} = 2.5$ V)
- Schmitt-Trigger Inputs Reject Input Noise and Provide Better Output Signal Integrity
- I_{off} Supports Partial Power Down ($V_{CC} = 0$ V)
- Very Low Static Power Consumption: 0.1 μ A
- Very Low Dynamic Power Consumption: 0.9 μ A
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II
- Pb-Free Packages Available: SC-70 (DCK) 2 x 2.1 x 0.65 mm (Height 1.1 mm)
- More Gate Options Available at www.ti.com/littlelogic
- ESD Performance Tested Per JESD 22
 - 2000-V Human Body Model (A114-B, Class II)
 - 1000-V Charged-Device Model (C101)

2 Applications

- AV Receivers
- Audio Dock: Portable
- Blu-ray Players and Home Theaters
- MP3 Players and Recorders
- Personal Digital Assistant (PDA)
- Power: Telecom/Server AC/DC Supply: Single Controller: Analog and Digital
- Solid State Drive (SSD): Client and Enterprise
- TV: LCD/Digital and High-Definition (HDTV)
- Tablet: Enterprise
- Video Analytics: Servers
- Wireless Headsets, Keyboards, and Mice

3 Description

The SN74AUP1T17 performs the Boolean function $Y = A$ with designation for logic-level translation applications with output referenced to supply V_{CC} .

AUP technology is the industry's lowest-power logic technology designed for use in extending battery-life in operating. All input levels that accept 1.8-V LVCMOS signals, while operating from either a single 3.3-V or 2.5-V V_{CC} supply. This product also maintains excellent signal integrity (see [Figure 4](#) and [Figure 1](#)).

The wide V_{CC} range of 2.3 V to 3.6 V allows the possibility of switching output level to connect to external controllers or processors.

Schmitt-trigger inputs ($\Delta V_T = 210$ mV between positive and negative input transitions) offer improved noise immunity during switching transitions, which is especially useful on analog mixed-mode designs. Schmitt-trigger inputs reject input noise, ensure integrity of output signals, and allow for slow input signal transition.

I_{off} is a feature that allows for powered-down conditions ($V_{CC} = 0$ V) and is important in portable and mobile applications. When $V_{CC} = 0$ V, signals in the range from 0 V to 3.6 V can be applied to the inputs and outputs of the device. No damage occurs to the device under these conditions.

The SN74AUP1T17 is designed with optimized current-drive capability of 4 mA to reduce line reflections, overshoot, and undershoot caused by high-drive outputs.

Device Information⁽¹⁾

| PART NUMBER | PACKAGE | BODY SIZE (NOM) |
|----------------|----------|-------------------|
| SN74AUP1T17DCK | SC70 (5) | 2.00 mm x 1.25 mm |

(1) For all available packages, see the orderable addendum at the end of the data sheet.

Simplified Schematic



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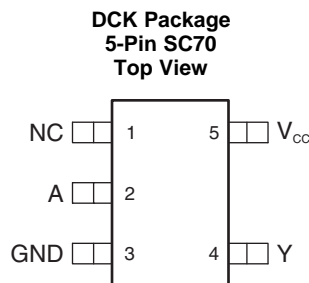
4 Revision History

Changes from Original (April 2010) to Revision A

Page

- Added *Pin Configuration and Functions* section, *ESD Ratings* table, *Feature Description* section, *Device Functional Modes*, *Application and Implementation* section, *Power Supply Recommendations* section, *Layout* section, *Device and Documentation Support* section, and *Mechanical, Packaging, and Orderable Information* section **1**

5 Pin Configuration and Functions



Pin Functions

| PIN | | I/O | DESCRIPTION |
|-----------------|-----|-----|----------------|
| NAME | NO. | | |
| NC | 1 | — | Not connected |
| A | 2 | I | Input |
| GND | 3 | — | Ground |
| Y | 4 | O | Output |
| V _{CC} | 5 | — | Power terminal |

6 Specifications

6.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)⁽¹⁾

| | | MIN | MAX | UNIT | |
|------------------|---|--------------------|-----------------------|------|----|
| V _{CC} | Supply voltage | −0.5 | 4.6 | V | |
| V _I | Input voltage ⁽²⁾ | −0.5 | 4.6 | V | |
| V _O | Voltage applied to any output in the high-impedance or power-off state ⁽²⁾ | −0.5 | 4.6 | V | |
| V _O | Output voltage in the high or low state ⁽²⁾ | −0.5 | V _{CC} + 0.5 | V | |
| I _{IK} | Input clamp current | V _I < 0 | | −50 | mA |
| I _{OK} | Output clamp current | V _O < 0 | | −50 | mA |
| I _O | Continuous output current | | | ±20 | mA |
| | Continuous current through V _{CC} or GND | | | ±50 | mA |
| T _{stg} | Storage temperature | −65 | 150 | °C | |

(1) 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.

(2) The input negative-voltage and output voltage ratings may be exceeded if the input and output current ratings are observed.

6.2 ESD Ratings

| | | | VALUE | UNIT |
|--------------------|-------------------------|--|-------|------|
| V _(ESD) | Electrostatic discharge | Human-body model (HBM), per ANSI/ESDA/JEDEC JS-001 ⁽¹⁾ | 2000 | V |
| | | Charged-device model (CDM), per JEDEC specification JESD22-C101 ⁽²⁾ | 1000 | |

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.

(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

6.3 Recommended Operating Conditions⁽¹⁾

| | | MIN | MAX | UNIT |
|-----------------|--------------------------------|-------------------------|-----------------|------|
| V _{CC} | Supply voltage | 2.3 | 3.6 | V |
| V _I | Input voltage | 0 | 3.6 | V |
| V _O | Output voltage | 0 | V _{CC} | V |
| I _{OH} | High-level output current | V _{CC} = 2.3 V | -3.1 | mA |
| | | V _{CC} = 3 V | -4 | |
| I _{OL} | Low-level output current | V _{CC} = 2.3 V | 3.1 | mA |
| | | V _{CC} = 3 V | 4 | |
| T _A | Operating free-air temperature | -40 | 85 | °C |

(1) All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. See the TI application report *Implications of Slow or Floating CMOS Inputs*, [SCBA004](#).

6.4 Thermal Information

| THERMAL METRIC ⁽¹⁾ | SN74AUP1T17 | UNIT | |
|-------------------------------|--|------|------|
| | DCK (SC70) | | |
| | 5 PINS | | |
| R _{θJA} | Junction-to-ambient thermal resistance | 280 | °C/W |

(1) For more information about traditional and new thermal metrics, see the *Semiconductor and IC Package Thermal Metrics* application report, [SPRA953](#).

6.5 Electrical Characteristics

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

| PARAMETER | TEST CONDITIONS | V _{CC} | T _A = 25°C | | | T _A = -40°C to 85°C | | UNIT |
|--|---------------------------|---|-----------------------|-----|------|--------------------------------|------|------|
| | | | MIN | TYP | MAX | MIN | MAX | |
| V _{T+} Positive-going input threshold voltage | | 2.3 V to 2.7 V | 0.6 | | 1.1 | 0.6 | 1.1 | V |
| | | 3 V to 3.6 V | 0.75 | | 1.16 | 0.75 | 1.19 | |
| V _{T-} Negative-going input threshold voltage | | 2.3 V to 2.7 V | 0.35 | | 0.6 | 0.35 | 0.6 | V |
| | | 3 V to 3.6 V | 0.5 | | 0.85 | 0.5 | 0.85 | |
| ΔV _T Hysteresis (V _{T+} - V _{T-}) | | 2.3 V to 2.7 V | 0.23 | | 0.6 | 0.1 | 0.6 | V |
| | | 3 V to 3.6 V | 0.25 | | 0.56 | 0.15 | 0.56 | |
| V _{OH} | I _{OH} = -20 μA | 2.3 V to 3.6 V | V _{CC} - 0.1 | | | V _{CC} - 0.1 | | V |
| | I _{OH} = -2.3 mA | 2.3 V | 2.05 | | | 1.97 | | |
| | I _{OH} = -3.1 mA | | 1.9 | | | 1.85 | | |
| | I _{OH} = -2.7 mA | 3 V | 2.72 | | | 2.67 | | |
| | I _{OH} = -4 mA | | 2.6 | | | 2.55 | | |
| V _{OL} | I _{OL} = 20 μA | 2.3 V to 3.6 V | | | | 0.1 | | V |
| | I _{OL} = 2.3 mA | 2.3 V | | | | 0.31 | | |
| | I _{OL} = 3.1 mA | | | | | 0.44 | | |
| | I _{OL} = 2.7 mA | 3 V | | | | 0.31 | | |
| | I _{OL} = 4 mA | | | | | 0.44 | | |
| I _I | All inputs | V _I = 3.6 V or GND | 0 V to 3.6 V | | | 0.1 | | μA |
| I _{off} | | V _I or V _O = 0 V to 3.6 V | 0 V | | | 0.1 | | μA |
| ΔI _{off} | | V _I or V _O = 3.6 V | 0 V to 0.2 V | | | 0.2 | | μA |
| I _{CC} | | V _I = 3.6 V or GND, I _O = 0 | 2.3 V to 3.6 V | | | 0.5 | | μA |

Electrical Characteristics (continued)

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

| PARAMETER | TEST CONDITIONS | V _{CC} | T _A = 25°C | | | T _A = –40°C to 85°C | | UNIT |
|------------------|--|-----------------|-----------------------|-----|-----|--------------------------------|-----|------|
| | | | MIN | TYP | MAX | MIN | MAX | |
| ΔI _{CC} | One input at 0.3 V or 1.1 V, Other inputs at 0 or V _{CC} , I _O = 0 | 2.3 V to 2.7 V | | | | | 4 | μA |
| | One input at 0.45 V or 1.2 V, Other inputs at 0 or V _{CC} , I _O = 0 | 3 V to 3.6 V | | | | | 12 | |
| C _i | V _I = V _{CC} or GND | 3.3 V | | 1.5 | | | | pF |
| C _o | V _O = V _{CC} or GND | 3.3 V | | 3 | | | | pF |

6.6 Switching Characteristics, V_{CC} = 2.5 V and V_I = 1.8 V

over recommended operating free-air temperature range, V_{CC} = 2.5 V ± 0.2 V, V_I = 1.8 V ± 0.15 V (unless otherwise noted)
(see [Figure 2](#))

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | C _L | T _A = 25°C | | | T _A = –40°C to 85°C | | UNIT |
|-----------------|--------------|-------------|----------------|-----------------------|-----|-----|--------------------------------|------|------|
| | | | | MIN | TYP | MAX | MIN | MAX | |
| t _{pd} | A | Y | 5 pF | 1.8 | 2.3 | 2.9 | 0.5 | 6.8 | ns |
| | | | 10 pF | 2.3 | 2.8 | 3.4 | 1 | 7.9 | |
| | | | 15 pF | 2.6 | 3.1 | 3.8 | 1 | 8.7 | |
| | | | 30 pF | 3.8 | 4.4 | 5.1 | 1.5 | 10.8 | |

6.7 Switching Characteristics, V_{CC} = 2.5 V and V_I = 2.5 V

over recommended operating free-air temperature range, V_{CC} = 2.5 V ± 0.2 V, V_I = 2.5 V ± 0.2 V (unless otherwise noted)
(see [Figure 2](#))

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | C _L | T _A = 25°C | | | T _A = –40°C to 85°C | | UNIT |
|-----------------|--------------|-------------|----------------|-----------------------|-----|-----|--------------------------------|-----|------|
| | | | | MIN | TYP | MAX | MIN | MAX | |
| t _{pd} | A | Y | 5 pF | 1.8 | 2.3 | 3.1 | 0.5 | 6 | ns |
| | | | 10 pF | 2.2 | 2.8 | 3.5 | 1 | 7.1 | |
| | | | 15 pF | 2.6 | 3.2 | 5.2 | 1 | 7.9 | |
| | | | 30 pF | 3.7 | 4.4 | 5.2 | 1.5 | 10 | |

6.8 Switching Characteristics, V_{CC} = 2.5 V and V_I = 3.3 V

over recommended operating free-air temperature range, V_{CC} = 2.5 V ± 0.2 V, V_I = 3.3 V ± 0.3 V (unless otherwise noted)
(see [Figure 2](#))

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | C _L | T _A = 25°C | | | T _A = –40°C to 85°C | | UNIT |
|-----------------|--------------|-------------|----------------|-----------------------|-----|-----|--------------------------------|-----|------|
| | | | | MIN | TYP | MAX | MIN | MAX | |
| t _{pd} | A | Y | 5 pF | 2 | 2.7 | 3.5 | 0.5 | 5.5 | ns |
| | | | 10 pF | 2.4 | 3.1 | 3.9 | 1 | 6.5 | |
| | | | 15 pF | 2.8 | 3.5 | 4.3 | 1 | 7.4 | |
| | | | 30 pF | 4 | 4.7 | 5.5 | 1.5 | 9.5 | |

6.9 Switching Characteristics, $V_{CC} = 3.3\text{ V}$ and $V_I = 1.8\text{ V}$

over recommended operating free-air temperature range, $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$, $V_I = 1.8\text{ V} \pm 0.15\text{ V}$ (unless otherwise noted) (see [Figure 2](#))

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | C_L | $T_A = 25^\circ\text{C}$ | | | $T_A = -40^\circ\text{C}$ to 85°C | | UNIT |
|-----------|--------------|-------------|-------|--------------------------|-----|-----|---|-----|------|
| | | | | MIN | TYP | MAX | MIN | MAX | |
| t_{pd} | A | Y | 5 pF | 1.6 | 2 | 2.5 | 0.5 | 8 | ns |
| | | | 10 pF | 2 | 2.4 | 2.9 | 1 | 8.5 | |
| | | | 15 pF | 2.3 | 2.8 | 3.3 | 1 | 9.1 | |
| | | | 30 pF | 3.4 | 3.9 | 4.4 | 1.5 | 9.8 | |

6.10 Switching Characteristics, $V_{CC} = 3.3\text{ V}$ and $V_I = 2.5\text{ V}$

over recommended operating free-air temperature range, $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$, $V_I = 2.5\text{ V} \pm 0.2\text{ V}$ (unless otherwise noted) (see [Figure 2](#))

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | C_L | $T_A = 25^\circ\text{C}$ | | | $T_A = -40^\circ\text{C}$ to 85°C | | UNIT |
|-----------|--------------|-------------|-------|--------------------------|-----|-----|---|-----|------|
| | | | | MIN | TYP | MAX | MIN | MAX | |
| t_{pd} | A | Y | 5 pF | 1.6 | 1.9 | 2.4 | 0.5 | 5.3 | ns |
| | | | 10 pF | 2 | 2.3 | 2.7 | 1 | 6.1 | |
| | | | 15 pF | 2.3 | 2.7 | 3.1 | 1 | 6.8 | |
| | | | 30 pF | 3.4 | 3.8 | 4.2 | 1.5 | 8.5 | |

6.11 Switching Characteristics, $V_{CC} = 3.3\text{ V}$ and $V_I = 3.3\text{ V}$

over recommended operating free-air temperature range, $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$, $V_I = 3.3\text{ V} \pm 0.3\text{ V}$ (unless otherwise noted) (see [Figure 2](#))

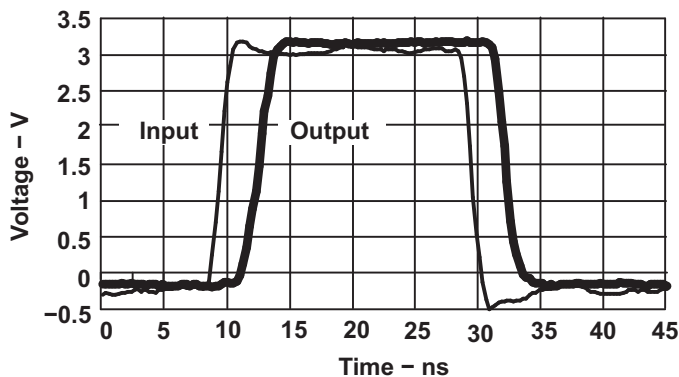
| PARAMETER | FROM (INPUT) | TO (OUTPUT) | C_L | $T_A = 25^\circ\text{C}$ | | | $T_A = -40^\circ\text{C}$ to 85°C | | UNIT |
|-----------|--------------|-------------|-------|--------------------------|-----|-----|---|-----|------|
| | | | | MIN | TYP | MAX | MIN | MAX | |
| t_{pd} | A | Y | 5 pF | 1.6 | 2.1 | 2.7 | 0.5 | 4.7 | ns |
| | | | 10 pF | 2 | 2.4 | 3 | 1 | 5.7 | |
| | | | 15 pF | 2.3 | 2.7 | 3.3 | 1 | 6.2 | |
| | | | 30 pF | 3.4 | 3.8 | 4.4 | 1.5 | 7.8 | |

6.12 Operating Characteristics

$T_A = 25^\circ\text{C}$

| PARAMETER | TEST CONDITIONS | $V_{CC} = 2.5\text{ V}$ | $V_{CC} = 3.3\text{ V}$ | UNIT |
|--|---------------------|-------------------------|-------------------------|------|
| | | TYP | TYP | |
| C_{pd} Power dissipation capacitance | $f = 10\text{ MHz}$ | 4 | 5 | pF |

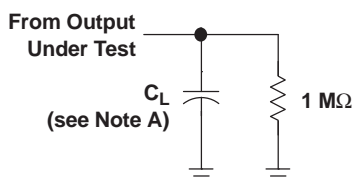
6.13 Typical Characteristics



AUP1G08 data at $C_L = 15 \text{ pF}$

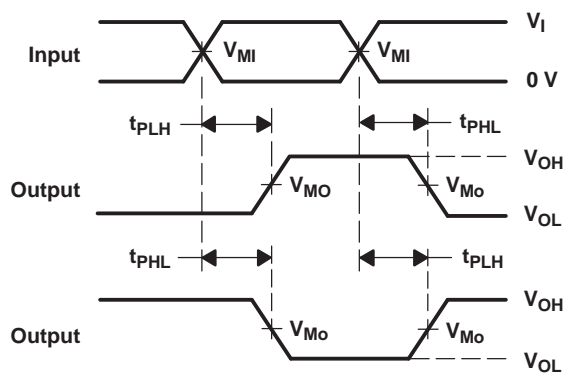
Figure 1. Switching Characteristics at 25 MHz

7 Parameter Measurement Information



LOAD CIRCUIT

| | $V_{CC} = 2.5 \text{ V}$ $\pm 0.2 \text{ V}$ | $V_{CC} = 3.3 \text{ V}$ $\pm 0.3 \text{ V}$ |
|----------|---|---|
| C_L | 5, 10, 15, 30 pF | 5, 10, 15, 30 pF |
| V_{MI} | $V_I/2$ | $V_I/2$ |
| V_{MO} | $V_{CC}/2$ | $V_{CC}/2$ |



VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES
INVERTING AND NONINVERTING OUTPUTS

- NOTES:
- A. C_L includes probe and jig capacitance.
 - B. All input pulses are supplied by generators having the following characteristics: PRR $\leq 10 \text{ MHz}$, $Z_O = 50 \text{ }\Omega$, slew rate $\geq 1 \text{ V/ns}$.
 - C. The outputs are measured one at a time, with one transition per measurement.
 - D. t_{PLH} and t_{PHL} are the same as t_{pd} .

Figure 2. Load Circuit and Voltage Waveforms

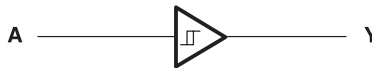
8 Detailed Description

8.1 Overview

The SN74AUP1T17 device contains one Schmitt trigger buffer and performs the Boolean function $Y = A$. The device functions as an independent buffer, but because of Schmitt action, it will have different input threshold levels for a positive-going (V_{T+}) and negative-going signals.

This device is fully specified for partial-power-down applications using I_{off} . The I_{off} circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

8.2 Functional Block Diagram



8.3 Feature Description

The distinguishing feature of the SN74AUP1T17 versus its standard-logic counterpart, the SN74AUP1G17, is the lowered switching input threshold. The SN74AUP1T17 will switch to a high output at a lower voltage threshold, which allows up-translation from signals that may not reach V_{CC} levels.

The I_{OFF} feature prevents the outputs from sinking current when $V_{CC} = 0$ V, providing extra isolation in systems where not all modules are powered simultaneously.

8.4 Device Functional Modes

[Table 1](#) lists the functional modes for SN74AUP1T17.

Table 1. Function Table

| INPUT A | OUTPUT Y |
|------------|-------------|
| H | H |
| L | L |

9 Application and Implementation

NOTE

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes. Customers should validate and test their design implementation to confirm system functionality.

9.1 Application Information

The SN74AUP1T17 is a low-power CMOS device that can be used for a multitude of buffer type functions where the input is slow or noisy. The inputs are 5.5-V tolerant allowing it to translate down to V_{CC} . In addition, the device can translate a signal up to V_{CC} when the input is at least V_{T+} (max).

9.2 Typical Application

This application is for a low-cost oscillator. The SN74AUP1T17 at the output cleans up the noise from the clock generator so that it can be used in the system.

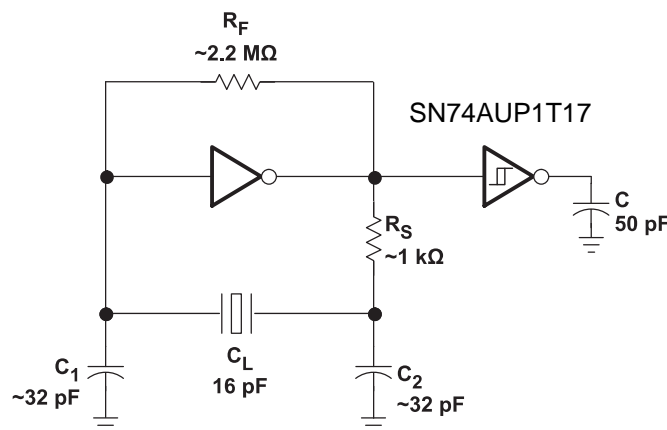


Figure 3. Low-Cost Oscillator

9.2.1 Design Requirements

This device uses CMOS technology and has balanced output drive. Take care to avoid bus contention because it can drive currents that would exceed maximum limits. The high drive will also create fast edges into light loads so routing and load conditions should be considered to prevent ringing.

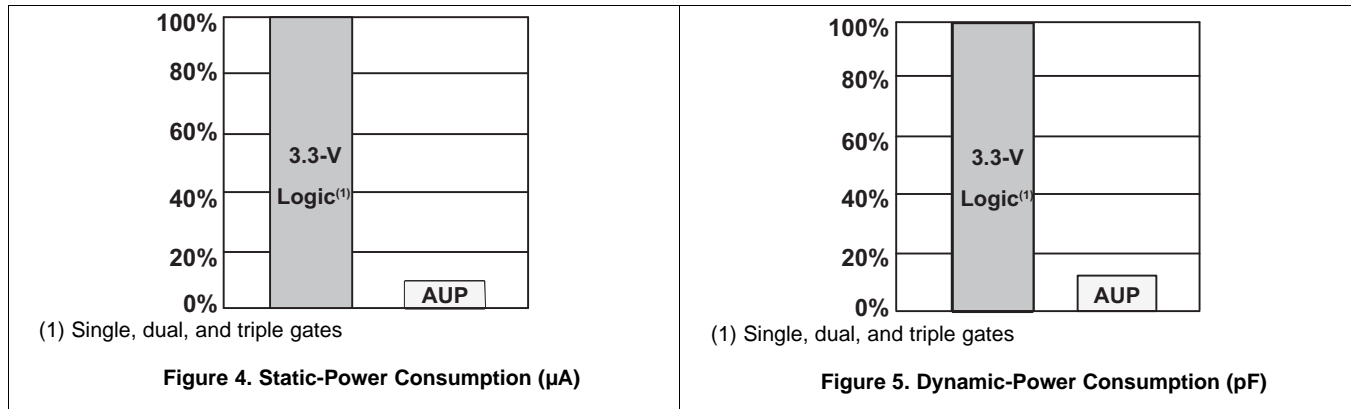
9.2.2 Detailed Design Procedure

1. Recommended Input Conditions
 - Specified high and low levels. See (V_{T+} and V_{T-}) in the [Recommended Operating Conditions](#) table.
 - Inputs are overvoltage tolerant allowing them to go as high as (V_I max) in the [Recommended Operating Conditions](#) table at any valid V_{CC} .
2. Recommend Output Conditions
 - Load currents should not exceed (I_O max) per output and should not exceed (continuous current through V_{CC} or GND) total current for the part. These limits are located in the [Absolute Maximum Ratings](#) table.
 - Outputs should not be pulled above V_{CC} .

Typical Application (continued)

9.2.3 Application Curves

Figure 4 and Figure 5 show the power consumption with the AUP family.



10 Power Supply Recommendations

The power supply can be any voltage between the min and max supply voltage rating located in the [Recommended Operating Conditions](#) table.

Each V_{CC} pin should have a good bypass capacitor to prevent power disturbance. For devices with a single supply a 0.1-µF capacitor is recommended and if there are multiple V_{CC} pins then a 0.01-µF or 0.022-µF capacitor is recommended for each power pin. It is ok to parallel multiple bypass caps to reject different frequencies of noise. 0.1-µF and 1-µF capacitors are commonly used in parallel. The bypass capacitor should be installed as close to the power pin as possible for best results.

11 Layout

11.1 Layout Guidelines

When using multiple bit logic devices inputs should not ever float. In many cases, functions or parts of functions of digital logic devices are unused, for example, when only two inputs of a triple-input AND gate are used or only 3 of the 4 buffer gates are used. Such input terminals should not be left unconnected because the undefined voltages at the outside connections result in undefined operational states. Specified below are the rules that must be observed under all circumstances. All unused inputs of digital logic devices must be connected to a high or low bias to prevent them from floating. The logic level that should be applied to any particular unused input depends on the function of the device. Generally they will be tied to Gnd or V_{CC} whichever make more sense or is more convenient.

11.2 Layout Example

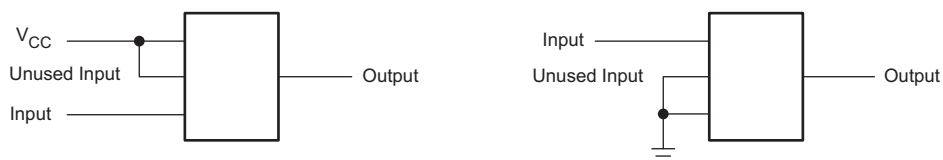


Figure 6. Layout Example Schematic

12 Device and Documentation Support

12.1 Community Resources

The following links connect to TI community resources. Linked contents are provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's [Terms of Use](#).

TI E2E™ Online Community *TI's Engineer-to-Engineer (E2E) Community*. Created to foster collaboration among engineers. At e2e.ti.com, you can ask questions, share knowledge, explore ideas and help solve problems with fellow engineers.

Design Support *TI's Design Support* Quickly find helpful E2E forums along with design support tools and contact information for technical support.

12.2 Trademarks

E2E is a trademark of Texas Instruments.
All other trademarks are the property of their respective owners.

12.3 Electrostatic Discharge Caution



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

12.4 Glossary

[SLYZ022](#) — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.

13 Mechanical, Packaging, and Orderable Information

The following pages include mechanical packaging and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

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) |
|-----------------------------------|---------------|----------------------|----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|---------------------|
| SN74AUP1T17DCKR | Active | Production | SC70 (DCK) 5 | 3000 LARGE T&R | Yes | NIPDAU SN | Level-1-260C-UNLIM | -40 to 85 | (675, 67F) |
| SN74AUP1T17DCKR.B | Active | Production | SC70 (DCK) 5 | 3000 LARGE T&R | Yes | SN | Level-1-260C-UNLIM | -40 to 85 | (675, 67F) |
| SN74AUP1T17DCKRG4 | Active | Production | SC70 (DCK) 5 | 3000 LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | (675, 67F) |
| SN74AUP1T17DCKRG4.B | Active | Production | SC70 (DCK) 5 | 3000 LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | (675, 67F) |

(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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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 |
|-------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74AUP1T17DCKR | SC70 | DCK | 5 | 3000 | 180.0 | 8.4 | 2.3 | 2.5 | 1.2 | 4.0 | 8.0 | Q3 |
| SN74AUP1T17DCKR | SC70 | DCK | 5 | 3000 | 178.0 | 9.2 | 2.4 | 2.4 | 1.22 | 4.0 | 8.0 | Q3 |
| SN74AUP1T17DCKRG4 | SC70 | DCK | 5 | 3000 | 178.0 | 9.2 | 2.4 | 2.4 | 1.22 | 4.0 | 8.0 | Q3 |

TAPE AND REEL BOX DIMENSIONS


*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|-------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74AUP1T17DCKR | SC70 | DCK | 5 | 3000 | 210.0 | 185.0 | 35.0 |
| SN74AUP1T17DCKR | SC70 | DCK | 5 | 3000 | 180.0 | 180.0 | 18.0 |
| SN74AUP1T17DCKRG4 | SC70 | DCK | 5 | 3000 | 180.0 | 180.0 | 18.0 |

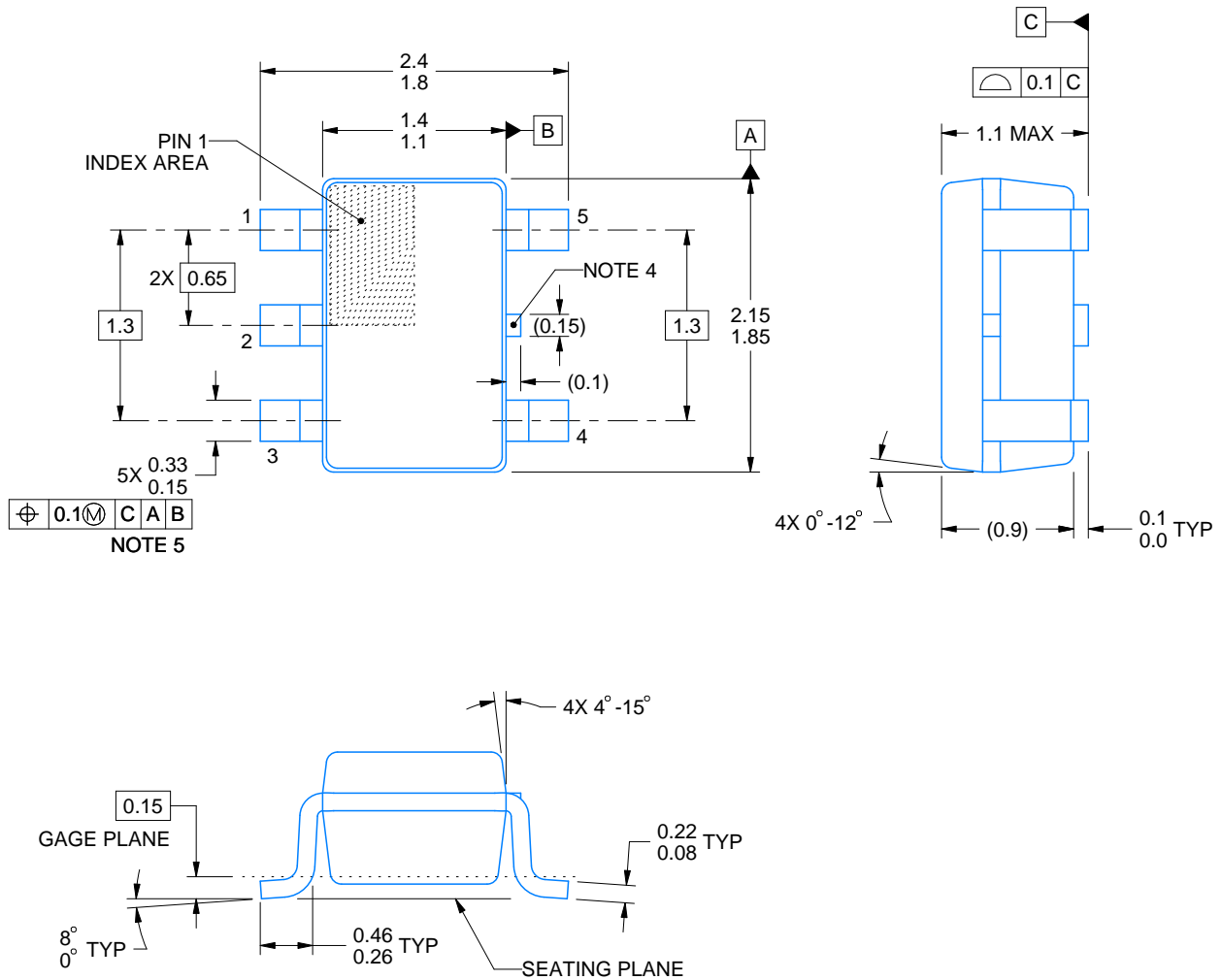
DCK0005A



PACKAGE OUTLINE

SOT - 1.1 max height

SMALL OUTLINE TRANSISTOR



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NOTES:

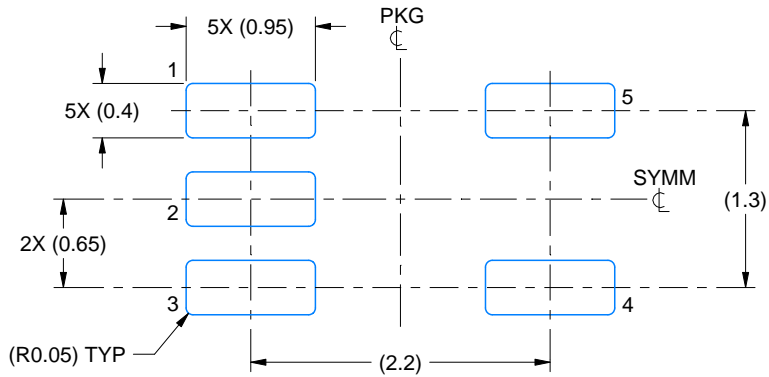
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Reference JEDEC MO-203.
4. Support pin may differ or may not be present.
5. Lead width does not comply with JEDEC.
6. Body dimensions do not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.25mm per side

EXAMPLE BOARD LAYOUT

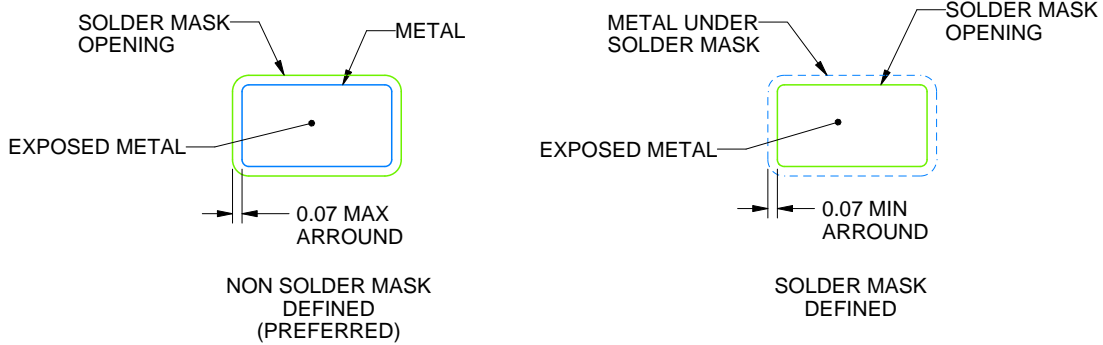
DCK0005A

SOT - 1.1 max height

SMALL OUTLINE TRANSISTOR



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:18X



SOLDER MASK DETAILS

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NOTES: (continued)

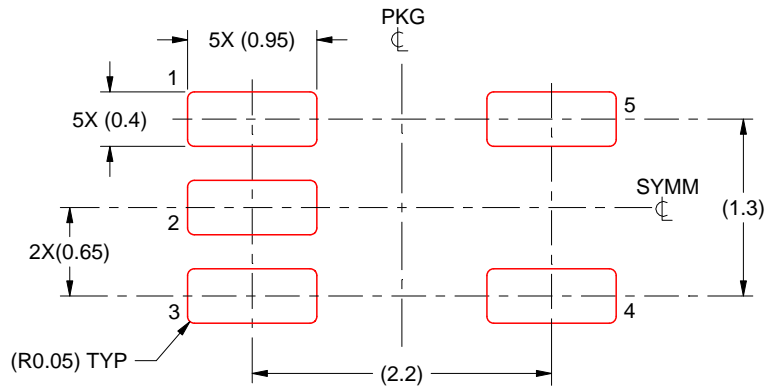
- 7. Publication IPC-7351 may have alternate designs.
- 8. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DCK0005A

SOT - 1.1 max height

SMALL OUTLINE TRANSISTOR



SOLDER PASTE EXAMPLE
BASED ON 0.125 THICK STENCIL
SCALE: 18X

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NOTES: (continued)

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

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