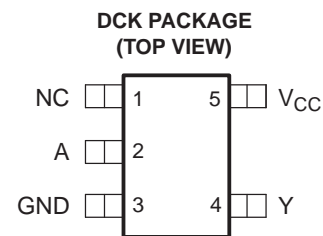


## FEATURES

- **Controlled Baseline**
  - One Assembly/Test Site, One Fabrication Site
- **Enhanced Diminishing Manufacturing Sources (DMS) Support**
- **Enhanced Product-Change Notification**
- **Qualification Pedigree <sup>(1)</sup>**
- **Available in the Texas Instruments NanoStar™ and NanoFree™ Packages**
- **Low Static-Power Consumption**  
( $I_{CC} = 0.9 \mu A$  Max)
- **Low Dynamic-Power Consumption**  
( $C_{pd} = 4.4$  pF Typ at 3.3 V)
- **Low Input Capacitance** ( $C_i = 1.5$  pF)
- **Low Noise – Overshoot and Undershoot**  
<10% of  $V_{CC}$
- **$I_{off}$  Supports Partial-Power-Down Mode Operation**
- **Includes Schmitt-Trigger Inputs**
- **Wide Operating  $V_{CC}$  Range of 0.8 V to 3.6 V**
- **Optimized for 3.3-V Operation**
- **3.6-V I/O Tolerant to Support Mixed-Mode Signal Operation**

- $t_{pd} = 5.1$  ns Max at 3.3 V
- **Suitable for Point-to-Point Applications**
- **Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II**
- **ESD Performance Tested Per JESD 22**
  - 2000-V Human-Body Model (A114-B, Class II)
  - 200-V Machine Model (A115-A)
  - 1000-V Charged-Device Model (C101)
- **ESD Protection Exceeds 5000 V With Human-Body Model**



- (1) Component qualification in accordance with JEDEC and industry standards to ensure reliable operation over an extended temperature range. This includes, but is not limited to, Highly Accelerated Stress Test (HAST) or biased 85/85, temperature cycle, autoclave or unbiased HAST, electromigration, bond intermetallic life, and mold compound life. Such qualification testing should not be viewed as justifying use of this component beyond specified performance and environmental limits.

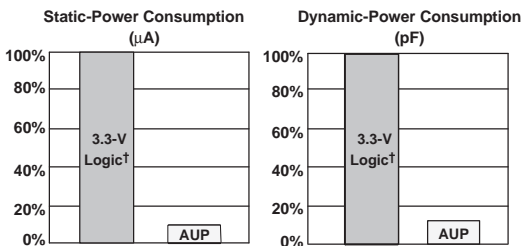
## DESCRIPTION/ORDERING INFORMATION

The AUP family is TI's premier solution to the industry's low-power needs in battery-powered portable applications. This family ensures a very low static- and dynamic-power consumption across the entire  $V_{CC}$  range of 0.8 V to 3.6 V, resulting in an increased battery life. This product also maintains excellent signal integrity (see Figures 1 and 2).



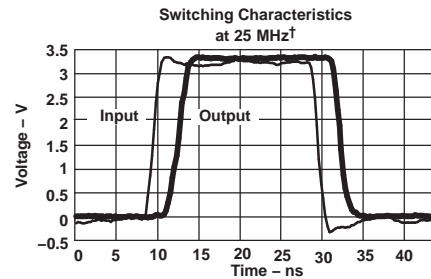
Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

NanoStar, NanoFree are trademarks of Texas Instruments.



† Single, dual, and triple gates

**Figure 1. AUP - The Lowest-Power Family**



† AUP1G08 data at  $C_L = 15$  pF

**Figure 2. Excellent Signal Integrity**

## DESCRIPTION/ORDERING INFORMATION (CONTINUED)

This device functions as an independent gate with Schmitt-trigger inputs, which allows for slow input transition and better switching noise immunity at the input.

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.

### ORDERING INFORMATION

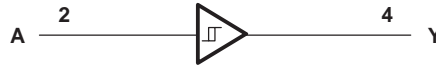
$T_A$	PACKAGE <sup>(1)</sup>		ORDERABLE PART NUMBER	TOP-SIDE MARKING <sup>(2)</sup>
-55°C to 125°C	SOT (SC-70) – DCK	Reel of 3000	SN74AUP1G17MDCKREP	BZU

- (1) Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at [www.ti.com/sc/package](http://www.ti.com/sc/package).
- (2) DCK: The actual top-side marking has three additional characters that designate the year, month, and assembly/test site. The actual top-side marking has three preceding characters to denote year, month, and sequence code, and one following character to designate the assembly/test site. Pin 1 identifier indicates solder-bump composition (1 = SnPb, • = Pb-free).

FUNCTION TABLE

INPUTS A	OUTPUT Y
H	H
L	L

LOGIC DIAGRAM (POSITIVE LOGIC)



Absolute Maximum Ratings<sup>(1)</sup>

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

		MIN	MAX	UNIT
$V_{CC}$	Supply voltage range	-0.5	4.6	V
$V_I$	Input voltage range <sup>(2)</sup>	-0.5	4.6	V
$V_O$	Voltage range applied to any output in the high-impedance or power-off state <sup>(2)</sup>	-0.5	4.6	V
$V_O$	Output voltage range in the high or low state <sup>(2)</sup>	-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		$\pm 20$	mA
	Continuous current through $V_{CC}$ or GND		$\pm 50$	mA
$\theta_{JA}$	Package thermal impedance <sup>(3)</sup>	DCK package	227	$^{\circ}\text{C}/\text{W}$
$T_{stg}$	Storage temperature range		-65 150	$^{\circ}\text{C}$

- (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.  
 (3) The package thermal impedance is calculated in accordance with JESD 51-7.

Recommended Operating Conditions<sup>(1)</sup>

		MIN	MAX	UNIT
$V_{CC}$	Supply voltage	0.8	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	$V_{CC} = 0.8\text{ V}$	-20	$\mu\text{A}$
		$V_{CC} = 1.1\text{ V}$	-1.1	mA
		$V_{CC} = 1.4\text{ V}$	-1.7	
		$V_{CC} = 1.65\text{ V}$	-1.9	
		$V_{CC} = 2.3\text{ V}$	-3.1	
		$V_{CC} = 3\text{ V}$	-4	
$I_{OL}$	Low-level output current	$V_{CC} = 0.8\text{ V}$	20	$\mu\text{A}$
		$V_{CC} = 1.1\text{ V}$	1.1	mA
		$V_{CC} = 1.4\text{ V}$	1.7	
		$V_{CC} = 1.65\text{ V}$	1.9	
		$V_{CC} = 2.3\text{ V}$	3.1	
		$V_{CC} = 3\text{ V}$	4	
$T_A$	Operating free-air temperature	-55	125	$^{\circ}\text{C}$

- (1) 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.

# SN74AUP1G17-EP LOW-POWER SINGLE SCHMITT-TRIGGER BUFFER

SCES684–JANUARY 2007

## Electrical Characteristics

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

PARAMETER	TEST CONDITIONS	V <sub>CC</sub>	T <sub>A</sub> = -55°C to 125°C			UNIT
			MIN	TYP	MAX	
V <sub>T+</sub> Positive-going input threshold voltage		0.8 V	0.3		0.6	V
		1.1 V	0.53		0.9	
		1.4 V	0.74		1.11	
		1.65 V	0.91		1.29	
		2.3 V	1.37		1.77	
		3 V	1.88		2.29	
V <sub>T-</sub> Negative-going input threshold voltage		0.8 V	0.1		0.6	V
		1.1 V	0.26		0.65	
		1.4 V	0.39		0.75	
		1.65 V	0.47		0.84	
		2.3 V	0.69		1.04	
		3 V	0.88		1.24	
ΔV <sub>T</sub> Hysteresis (V <sub>T+</sub> - V <sub>T-</sub> )		0.8 V	0.07		0.5	V
		1.1 V	0.08		0.46	
		1.4 V	0.18		0.56	
		1.65 V	0.27		0.66	
		2.3 V	0.53		0.92	
		3 V	0.79		1.31	
V <sub>OH</sub>	I <sub>OH</sub> = -20 μA I <sub>OH</sub> = -1.1 mA I <sub>OH</sub> = -1.7 mA I <sub>OH</sub> = -1.9 mA I <sub>OH</sub> = -2.3 mA I <sub>OH</sub> = -3.1 mA I <sub>OH</sub> = -2.7 mA I <sub>OH</sub> = -4 mA	0.8 V to 3.6 V	V <sub>CC</sub> - 0.2			V
		1.1 V	0.7 × V <sub>CC</sub>			
		1.4 V	1.03			
		1.65 V	1.3			
		2.3 V	1.97			
		2.3 V	1.85			
		3 V	2.67			
		3 V	2.55			
V <sub>OL</sub>	I <sub>OL</sub> = 20 μA I <sub>OL</sub> = 1.1 mA I <sub>OL</sub> = 1.7 mA I <sub>OL</sub> = 1.9 mA I <sub>OL</sub> = 2.3 mA I <sub>OL</sub> = 3.1 mA I <sub>OL</sub> = 2.7 mA I <sub>OL</sub> = 4 mA	0.8 V to 3.6 V			0.1	V
		1.1 V			0.3 × V <sub>CC</sub>	
		1.4 V			0.37	
		1.65 V			0.35	
		2.3 V			0.33	
		2.3 V			0.45	
		3 V			0.33	
		3 V			0.475	
I <sub>I</sub>	All inputs V <sub>I</sub> = GND to 3.6 V	0 V to 3.6 V			0.5	μA
I <sub>off</sub>	V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V	0 V			5.0	μA
ΔI <sub>off</sub>	V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V	0 V to 0.2 V			5.0	μA
I <sub>CC</sub>	V <sub>I</sub> = GND or (V <sub>CC</sub> to 3.6 V), I <sub>O</sub> = 0	0.8 V to 3.6 V			0.9	μA
ΔI <sub>CC</sub>	V <sub>I</sub> = V <sub>CC</sub> - 0.6 V, I <sub>O</sub> = 0	3.3 V			50	μA
C <sub>i</sub>	V <sub>I</sub> = V <sub>CC</sub> or GND	0 V		1.5		pF
		3.6 V		1.5		
C <sub>o</sub>	V <sub>O</sub> = GND	0 V		2.5		pF

### Switching Characteristics

over recommended operating free-air temperature range,  $C_L = 50$  pF (unless otherwise noted) (see [Figure 3](#) and [Figure 4](#))

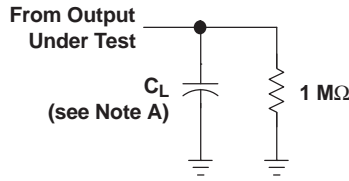
PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC}$	$T_A = -55^\circ\text{C}$ to $125^\circ\text{C}$		UNIT
				MIN	MAX	
$t_{pd}$	A	Y	$1.2\text{ V} \pm 0.1\text{ V}$	7.5	28	ns
			$1.5\text{ V} \pm 0.1\text{ V}$	5.6	20	
			$1.8\text{ V} \pm 0.15\text{ V}$	4.8	17	
			$2.5\text{ V} \pm 0.2\text{ V}$	4	13	
			$3.3\text{ V} \pm 0.3\text{ V}$	3.6	11	

### Operating Characteristics

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

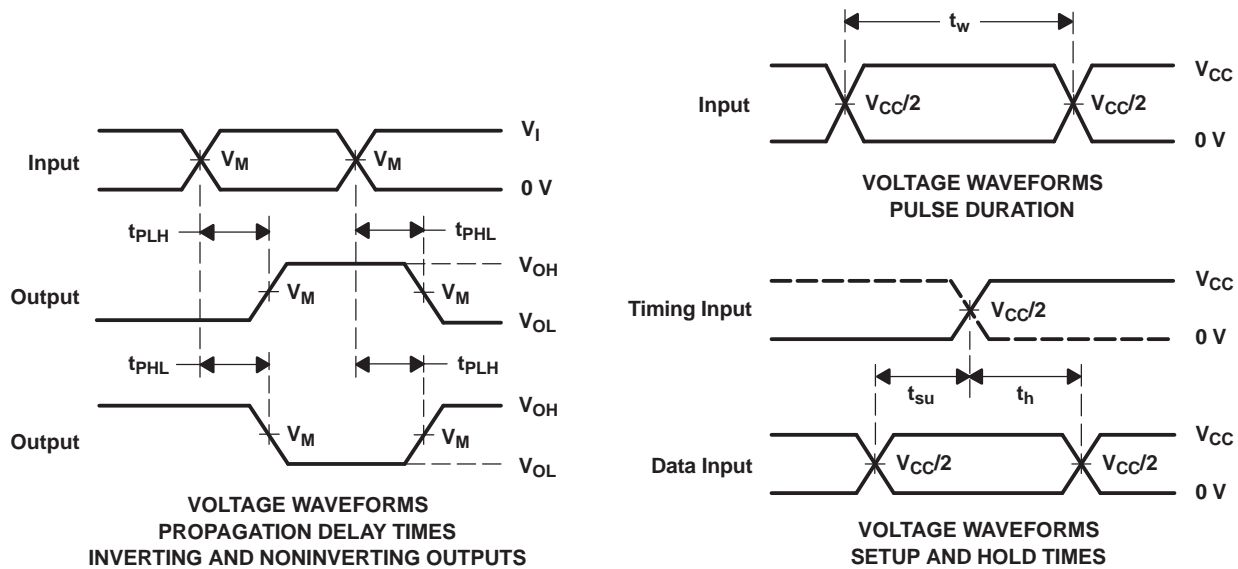
PARAMETER	TEST CONDITIONS	$V_{CC}$	TYP	UNIT
$C_{pd}$ Power dissipation capacitance	$f = 10\text{ MHz}$	0.8 V	4	pF
		$1.2 \pm 0.1\text{ V}$	4	
		$1.5 \pm 0.1\text{ V}$	4	
		$1.8\text{ V} \pm 0.15\text{ V}$	4	
		$2.5\text{ V} \pm 0.2\text{ V}$	4.2	
		$3.3\text{ V} \pm 0.3\text{ V}$	4.4	

PARAMETER MEASUREMENT INFORMATION  
 (Propagation Delays, Setup and Hold Times, and Pulse Width)



LOAD CIRCUIT

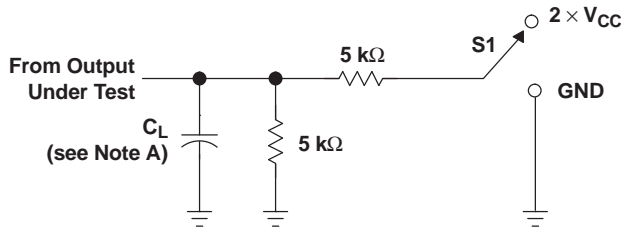
	$V_{CC} = 0.8 \text{ V}$	$V_{CC} = 1.2 \text{ V}$ $\pm 0.1 \text{ V}$	$V_{CC} = 1.5 \text{ V}$ $\pm 0.1 \text{ V}$	$V_{CC} = 1.8 \text{ V}$ $\pm 0.15 \text{ V}$	$V_{CC} = 2.5 \text{ V}$ $\pm 0.2 \text{ V}$	$V_{CC} = 3.3 \text{ V}$ $\pm 0.3 \text{ V}$
$C_L$	5, 10, 15, 30 pF	5, 10, 15, 30 pF	5, 10, 15, 30 pF	5, 10, 15, 30 pF	5, 10, 15, 30 pF	5, 10, 15, 30 pF
$V_M$	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$
$V_I$	$V_{CC}$	$V_{CC}$	$V_{CC}$	$V_{CC}$	$V_{CC}$	$V_{CC}$



- NOTES:
- A.  $C_L$  includes probe and jig capacitance.
  - B. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 10 \text{ MHz}$ ,  $Z_O = 50 \Omega$ , for propagation delays  $t_r/t_f = 3 \text{ ns}$ , for setup and hold times and pulse width  $t_r/t_f = 1.2 \text{ ns}$ .
  - C. The outputs are measured one at a time, with one transition per measurement.
  - D.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .
  - E. All parameters and waveforms are not applicable to all devices.

Figure 3. Load Circuit and Voltage Waveforms

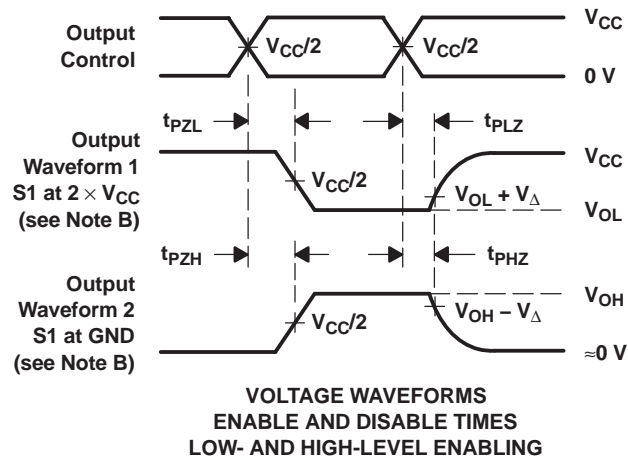
PARAMETER MEASUREMENT INFORMATION  
(Enable and Disable Times)



TEST	S1
$t_{PLZ}/t_{PZL}$	$2 \times V_{CC}$
$t_{PHZ}/t_{PZH}$	GND

LOAD CIRCUIT

	$V_{CC} = 0.8 \text{ V}$	$V_{CC} = 1.2 \text{ V}$ $\pm 0.1 \text{ V}$	$V_{CC} = 1.5 \text{ V}$ $\pm 0.1 \text{ V}$	$V_{CC} = 1.8 \text{ V}$ $\pm 0.15 \text{ V}$	$V_{CC} = 2.5 \text{ V}$ $\pm 0.2 \text{ V}$	$V_{CC} = 3.3 \text{ V}$ $\pm 0.3 \text{ V}$
$C_L$	5, 10, 15, 30 pF	5, 10, 15, 30 pF	5, 10, 15, 30 pF	5, 10, 15, 30 pF	5, 10, 15, 30 pF	5, 10, 15, 30 pF
$V_M$	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$
$V_I$	$V_{CC}$	$V_{CC}$	$V_{CC}$	$V_{CC}$	$V_{CC}$	$V_{CC}$
$V_{\Delta}$	0.1 V	0.1 V	0.1 V	0.15 V	0.15 V	0.3 V



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

- 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. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 10 \text{ MHz}$ ,  $Z_O = 50 \Omega$ ,  $t_r/t_f = 3 \text{ ns}$ .
  - D. The outputs are measured one at a time, with one transition per measurement.
  - E.  $t_{PLZ}$  and  $t_{PHZ}$  are the same as  $t_{dis}$ .
  - F.  $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{en}$ .
  - G. All parameters and waveforms are not applicable to all devices.

Figure 4. Load Circuit and Voltage Waveforms

**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
SN74AUP1G17MDCKREP	ACTIVE	SC70	DCK	5	3000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	BZU	<a href="#">Samples</a>
V62/07623-01XE	ACTIVE	SC70	DCK	5	3000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	BZU	<a href="#">Samples</a>

(1) The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

**RoHS Exempt:** TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

**Green:** TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead finish/Ball material - Orderable Devices 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.

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**OTHER QUALIFIED VERSIONS OF SN74AUP1G17-EP :**

- Catalog: [SN74AUP1G17](#)

## NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product

## 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
SN74AUP1G17MDCKRE P	SC70	DCK	5	3000	180.0	8.4	2.41	2.41	1.2	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)
SN74AUP1G17MDCKREP	SC70	DCK	5	3000	202.0	201.0	28.0

DCK (R-PDSO-G5)

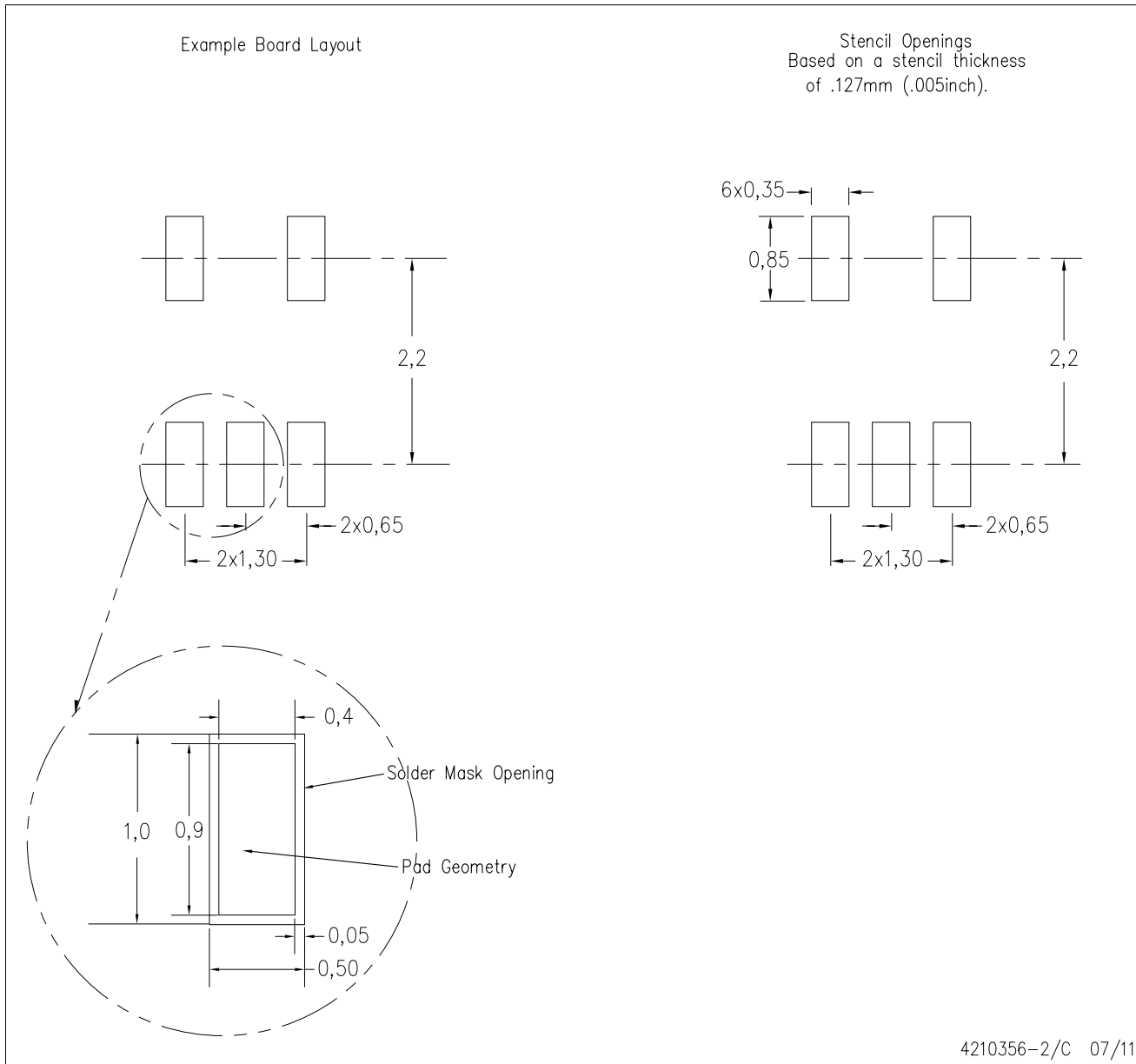
PLASTIC SMALL-OUTLINE PACKAGE



- 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. Mold flash and protrusion shall not exceed 0.15 per side.
  - D. Falls within JEDEC MO-203 variation AA.

DCK (R-PDSO-G5)

PLASTIC SMALL OUTLINE



- NOTES:
- All linear dimensions are in millimeters.
  - This drawing is subject to change without notice.
  - Customers should place a note on the circuit board fabrication drawing not to alter the center solder mask defined pad.
  - Publication IPC-7351 is recommended for alternate designs.
  - Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Example stencil design based on a 50% volumetric metal load solder paste. Refer to IPC-7525 for other stencil recommendations.

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