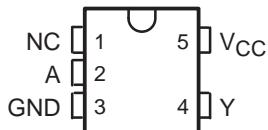


- Available in the Texas Instruments NanoStar™ and NanoFree™ Packages
- Low Static-Power Consumption; $I_{CC} = 0.9 \mu A$ Max
- Low Dynamic-Power Consumption; $C_{pd} = 1 \text{ pF}$ Typ at 3.3 V
- Low Input Capacitance; $C_i = 1.5 \text{ pF}$ Typ
- Low Noise – Overshoot and Undershoot <10% of V_{CC}
- I_{off} Supports Partial-Power-Down Mode Operation
- Input Hysteresis Allows Slow Input Transition and Better Switching Noise Immunity at the Input ($V_{hys} = 250 \text{ mV}$ Typ at 3.3 V)

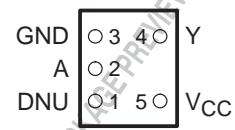
DBV OR DCK PACKAGE
(TOP VIEW)



NC – No internal connection

- 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
- $t_{pd} = 3.3 \text{ ns}$ 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 $\pm 5000 \text{ V}$ With Human-Body Model

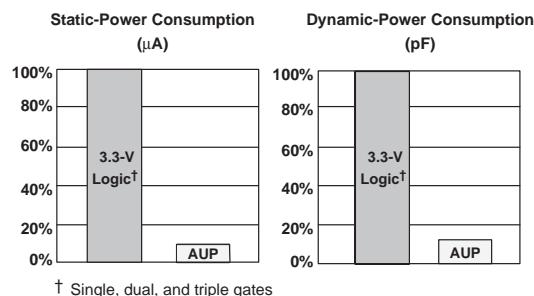
YEP OR YZP PACKAGE
(BOTTOM VIEW)



DNU – Do not use

description/ordering information

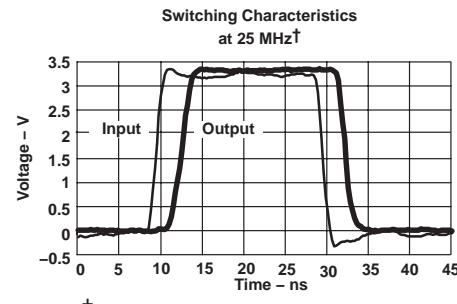
The AUP family is TI's premier solution to the industry's low power needs in battery-powered portable applications. This family ensures a very low static and dynamic power consumption across the entire V_{CC} range of 0.8 V to 3.6 V, resulting in an increased battery life. This product also maintains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



† Single, dual, and triple gates

Figure 1. AUP – The Lowest-Power Family

The output of this single buffer/driver is open drain, and can be connected to other open-drain outputs to implement active-low wired-OR or active-high wired-AND functions.



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

Figure 2. Excellent Signal Integrity



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.

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description/ordering information (continued)

NanoStar™ and NanoFree™ package technology is a major breakthrough in IC packaging concepts, using the die as the package.

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

TA	PACKAGE [†]	ORDERABLE PART NUMBER	TOP-SIDE MARKING [‡]
-40°C to 85°C	NanoStar™ – WCSP (DSBGA) 0.23-mm Large Bump – YEP	Reel of 3000	SN74AUP1G07YEPR
	NanoFree™ – WCSP (DSBGA) 0.23-mm Large Bump – YZP (Pb-free)		SN74AUP1G07YZPR
	SOT (SOT-23) – DBV	Reel of 3000	SN74AUP1G07DBVR
		Reel of 250	SN74AUP1G07DBVT
	SOT (SC-70) – DCK	Reel of 3000	SN74AUP1G07DCKR
		Reel of 250	SN74AUP1G07DCKT

[†] Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

[‡] DBV/DCK: The actual top-side marking has one additional character that designates the assembly/test site.

YEP/YZP: 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

INPUT A	OUTPUT Y
H	H
L	L

logic diagram (positive logic)



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

Supply voltage range, V_{CC}	-0.5 V to 4.6 V
Input voltage range, V_I (see Note 1)	-0.5 V to 4.6 V
Voltage range applied to any output in the high-impedance or power-off state, V_O (see Note 1)	-0.5 V to 4.6 V
Output voltage range in the high or low state, V_O (see Note 1)	-0.5 V to $V_{CC} + 0.5$ V
Input clamp current, I_{IK} ($V_I < 0$)	-50 mA
Output clamp current, I_{OK} ($V_O < 0$)	-50 mA
Continuous output current, I_O	± 20 mA
Continuous current through V_{CC} or GND	± 50 mA
Package thermal impedance, θ_{JA} (see Note 2):	
DBV package	206°C/W
DCK package	252°C/W
YEP/YZP package	132°C/W
Storage temperature range, T_{Stg}	-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.

NOTES: 1. The input negative-voltage and output voltage ratings may be exceeded if the input and output current ratings are observed.
2. The package thermal impedance is calculated in accordance with JESD 51-7.

recommended operating conditions (see Note 3)

			MIN	MAX	UNIT
V _{CC}	Supply voltage		0.8	3.6	V
V _{IH}	High-level input voltage	V _{CC} = 0.8 V	V _{CC}		V
		V _{CC} = 1.1 V to 1.95 V	0.65 × V _{CC}		
		V _{CC} = 2.3 V to 2.7 V	1.6		
		V _{CC} = 3 V to 3.6 V	2		
V _{IL}	Low-level input voltage	V _{CC} = 0.8 V		0	V
		V _{CC} = 1.1 V to 1.95 V		0.35 × V _{CC}	
		V _{CC} = 2.3 V to 2.7 V		0.7	
		V _{CC} = 3 V to 3.6 V		0.9	
V _I	Input voltage		0	3.6	V
V _O	Output voltage		0	3.6	V
I _{OL} ‡	Low-level output current	V _{CC} = 0.8 V		20	µA
		V _{CC} = 1.1 V		1.1	
		V _{CC} = 1.4 V		1.7	
		V _{CC} = 1.65 V		1.9	
		V _{CC} = 2.3 V		3.1	
		V _{CC} = 3 V		4	
Δt/Δv	Input transition rise or fall rate	V _{CC} = 0.8 V to 3.6 V		200	ns/V
T _A	Operating free-air temperature		-40	85	°C

[‡]Defined by the signal integrity requirements and design goal priorities.

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.

SN74AUP1G07

LOW-POWER SINGLE BUFFER/DRIVER
WITH OPEN-DRAIN OUTPUTS

SCES591 – JULY 2004

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 _{OL}	I _{OL} = 20 µA	0.8 V to 3.6 V		0.1		0.1		V
	I _{OL} = 1.1 mA	1.1 V		0.3 × V _{CC}		0.3 × V _{CC}		
	I _{OL} = 1.7 mA	1.4 V		0.31		0.37		
	I _{OL} = 1.9 mA	1.65 V		0.31		0.35		
	I _{OL} = 2.3 mA	2.3 V		0.31		0.33		
	I _{OL} = 3.1 mA			0.44		0.45		
	I _{OL} = 2.7 mA	3 V		0.31		0.33		
	I _{OL} = 4 mA			0.44		0.45		
I _I	A input	V _I = GND to 3.6 V	0 V to 3.6 V		0.1		0.5	µA
I _{off}		V _I or V _O = 0 V to 3.6 V	0 V		0.2		0.6	µA
ΔI _{off}		V _I or V _O = 0 V to 3.6 V	0 V to 0.2 V		0.2		0.6	µA
I _{CC}		V _I = GND or V _{CC} to 3.6 V, I _O = 0	0.8 V to 3.6 V		0.5		0.9	µA
ΔI _{CC}		V _I = V _{CC} – 0.6 V, I _O = 0	3.3 V		40		50	µA
C _i		V _I = V _{CC} or GND	0 V		1.5			pF
			3.6 V		1.7			
C _o		V _O = GND	0 V		1.7			pF

switching characteristics over recommended operating free-air temperature range, C_L = 5 pF (unless otherwise noted) (see Figures 3 and 4)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC}	T _A = 25°C			T _A = -40°C TO 85°C		UNIT
				MIN	TYP	MAX	MIN	MAX	
t _{pd}	A	Y	0.8 V		12.2				ns
			1.2 V ± 0.1 V	3.4	5.1	7.5	1.5	14.7	
			1.5 V ± 0.1 V	2.3	3.6	5.1	1.3	8.3	
			1.8 V ± 0.15 V	2.4	3.1	4	1	6.3	
			2.5 V ± 0.2 V	1.5	2.1	2.9	0.9	4.1	
			3.3 V ± 0.3 V	1.8	2.2	2.8	1.1	3.3	

switching characteristics over recommended operating free-air temperature range, C_L = 10 pF (unless otherwise noted) (see Figures 3 and 4)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC}	T _A = 25°C			T _A = -40°C TO 85°C		UNIT
				MIN	TYP	MAX	MIN	MAX	
t _{pd}	A	Y	0.8 V		15				ns
			1.2 V ± 0.1 V	4	6.2	9	2.4	16.2	
			1.5 V ± 0.1 V	3.1	4.4	6.1	2	9.4	
			1.8 V ± 0.15 V	3.3	3.9	4.8	1.6	7.1	
			2.5 V ± 0.2 V	2.1	2.8	3.5	1.3	4.8	
			3.3 V ± 0.3 V	2.3	3	4	1.4	4.5	

SN74AUP1G07
**LOW-POWER SINGLE BUFFER/DRIVER
 WITH OPEN-DRAIN OUTPUTS**

SCES591 – JULY 2004

switching characteristics over recommended operating free-air temperature range, $C_L = 15 \text{ pF}$ (unless otherwise noted) (see Figures 3 and 4)

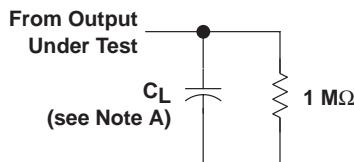
PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}	$T_A = 25^\circ\text{C}$			$T_A = -40^\circ\text{C}$ TO 85°C		UNIT
				MIN	TYP	MAX	MIN	MAX	
t_{pd}	A	Y	0.8 V		18.2				ns
			$1.2 \text{ V} \pm 0.1 \text{ V}$	4.9	7.3	10.4	3.2	17.6	
			$1.5 \text{ V} \pm 0.1 \text{ V}$	3.8	5.2	6.8	2.6	10.2	
			$1.8 \text{ V} \pm 0.15 \text{ V}$	3.4	4.8	6.7	2.2	7.9	
			$2.5 \text{ V} \pm 0.2 \text{ V}$	2.4	3.4	4.5	1.9	5.3	
			$3.3 \text{ V} \pm 0.3 \text{ V}$	2.2	3.7	5.4	1.8	6.1	

switching characteristics over recommended operating free-air temperature range, $C_L = 30 \text{ pF}$ (unless otherwise noted) (see Figures 3 and 4)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}	$T_A = 25^\circ\text{C}$			$T_A = -40^\circ\text{C}$ TO 85°C		UNIT
				MIN	TYP	MAX	MIN	MAX	
t_{pd}	A	Y	0.8 V		26.5				ns
			$1.2 \text{ V} \pm 0.1 \text{ V}$	8.1	10.7	14.4	4.5	21.9	
			$1.5 \text{ V} \pm 0.1 \text{ V}$	6.5	7.7	9.4	3.8	13	
			$1.8 \text{ V} \pm 0.15 \text{ V}$	5.8	7.5	9.7	3.2	11	
			$2.5 \text{ V} \pm 0.2 \text{ V}$	4.5	5.4	6.7	3	7.1	
			$3.3 \text{ V} \pm 0.3 \text{ V}$	3.9	6.3	9.7	2.8	10.4	

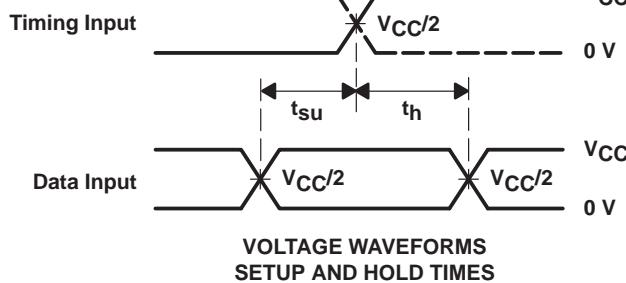
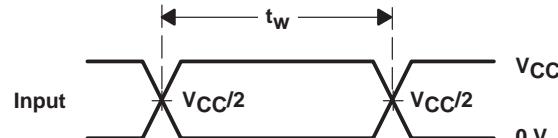
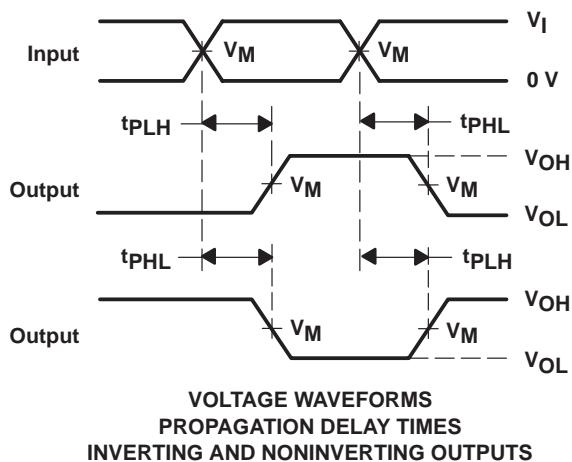
operating characteristics, $T_A = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	V_{CC}	TYP	UNIT
		0.8 V	1	
C_{pd} Power dissipation capacitance	$f = 10 \text{ MHz}$	1.2 V $\pm 0.1 \text{ V}$	1	pF
		1.5 V $\pm 0.1 \text{ V}$	1	
		1.8 V $\pm 0.15 \text{ V}$	1	
		2.5 V $\pm 0.2 \text{ V}$	1	
		3.3 V $\pm 0.3 \text{ V}$	1	

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

LOAD CIRCUIT

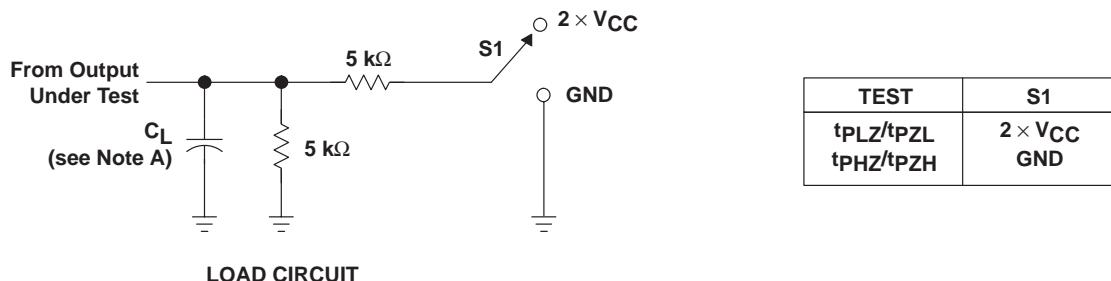
	$V_{CC} = 0.8 \text{ V}$	$V_{CC} = 1.2 \text{ V} \pm 0.1 \text{ V}$	$V_{CC} = 1.5 \text{ V} \pm 0.1 \text{ V}$	$V_{CC} = 1.8 \text{ V} \pm 0.15 \text{ V}$	$V_{CC} = 2.5 \text{ V} \pm 0.2 \text{ V}$	$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$
C_L	5, 10, 15, 30 pF	5, 10, 15, 30 pF	5, 10, 15, 30 pF	5, 10,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



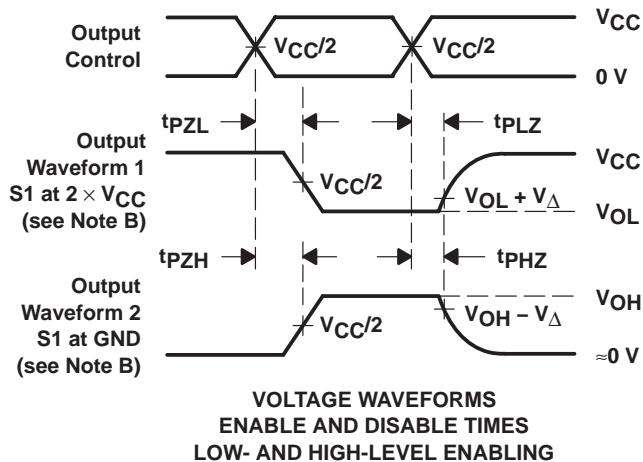
- NOTES:
- C_L includes probe and jig capacitance.
 - All input pulses are supplied by generators having the following characteristics: $PRR \leq 10 \text{ MHz}$, $Z_O = 50 \Omega$, $t_r/t_f = 3 \text{ ns}$.
 - The outputs are measured one at a time, with one transition per measurement.
 - t_{PLH} and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

Figure 3. Load Circuit and Voltage Waveforms

PARAMETER MEASUREMENT INFORMATION
(Enable and Disable Times)



	$V_{CC} = 0.8\text{ V}$	$V_{CC} = 1.2\text{ V} \pm 0.1\text{ V}$	$V_{CC} = 1.5\text{ V} \pm 0.1\text{ V}$	$V_{CC} = 1.8\text{ V} \pm 0.15\text{ V}$	$V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$	$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$
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_Δ	0.1 V	0.1 V	0.1 V	0.1 V	0.15 V	0.3 V

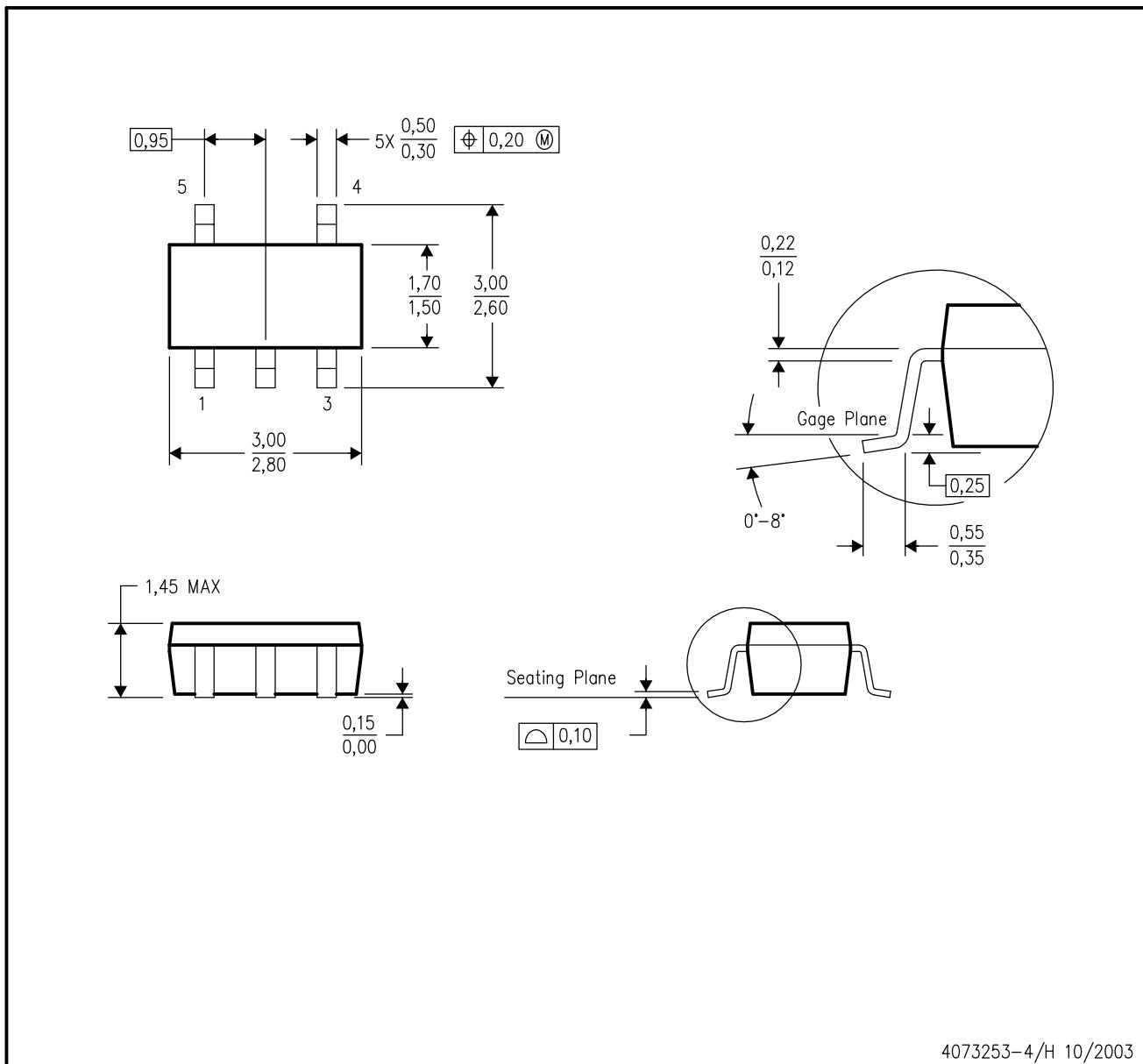


- NOTES:
- C_L includes probe and jig capacitance.
 - Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
 - All input pulses are supplied by generators having the following characteristics: $PRR \leq 10\text{ MHz}$, $Z_O = 50\text{ }\Omega$, $t_r/t_f = 3\text{ ns}$.
 - The outputs are measured one at a time, with one transition per measurement.
 - t_{PLZ} and t_{PHZ} are the same as t_{dis} .
 - t_{PZL} and t_{PZH} are the same as t_{en} .
 - All parameters and waveforms are not applicable to all devices.

Figure 4. Load Circuit and Voltage Waveforms

DBV (R-PDSO-G5)

PLASTIC SMALL-OUTLINE PACKAGE

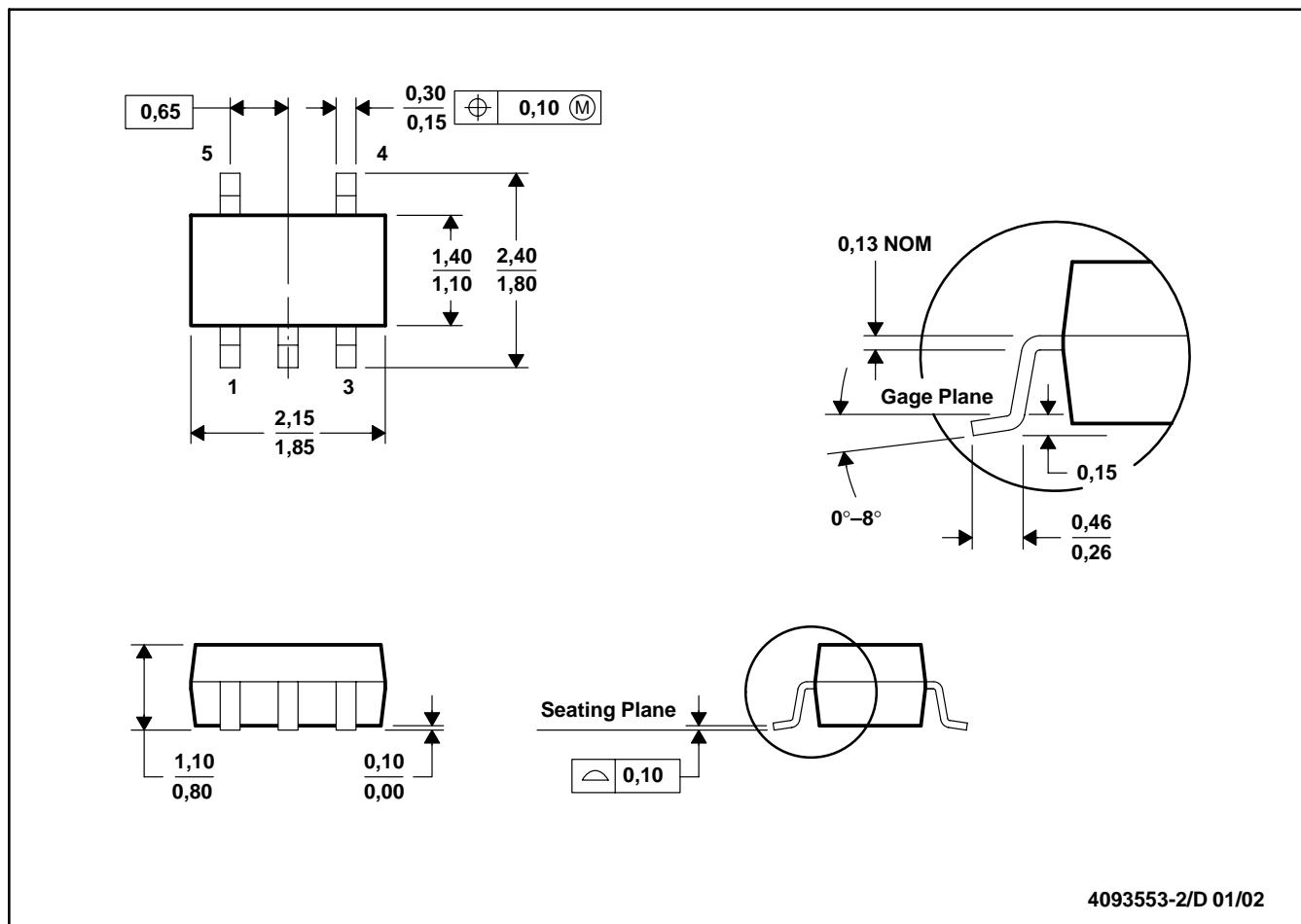


4073253-4/H 10/2003

- NOTES:
- All linear dimensions are in millimeters.
 - This drawing is subject to change without notice.
 - Body dimensions do not include mold flash or protrusion.
 - Falls within JEDEC MO-178 Variation AA.

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.
D. Falls within JEDEC MO-203

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Microcontrollers	microcontroller.ti.com	Security	www.ti.com/security
		Telephony	www.ti.com/telephony
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