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- Operating Range 2-V to 5.5-V V<sub>CC</sub>
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II
- ESD Protection Exceeds JESD 22
  - 2000-V Human-Body Model (A114-A)
  - 200-V Machine Model (A115-A)
  - 1000-V Charged-Device Model (C101)

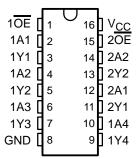
#### description

The 'AHC367 devices are hex buffers and line drivers designed for 2-V to 5.5-V V<sub>CC</sub> operation.

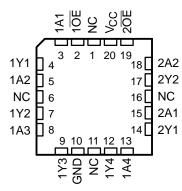
These devices are designed specifically to improve both the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters. The 'AHC367 devices are organized as dual 4-line and 2-line buffers/drivers with active-low output-enable (1OE and 2OE) inputs. When OE is low, the device passes noninverted data from the A inputs to the Y outputs. When OE is high, the outputs are in the high-impedance state.

To ensure the high-impedance state during power up or power down,  $\overline{OE}$  should be tied to  $V_{CC}$  through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

#### SN54AHC367 ... J OR W PACKAGE SN74AHC367 ... D, DB, DGV, N, OR PW PACKAGE (TOP VIEW)



# SN54AHC367 . . . FK PACKAGE (TOP VIEW)



NC - No internal connection

#### **ORDERING INFORMATION**

TA	PACKA	GE <sup>†</sup>	ORDERABLE PART NUMBER	TOP-SIDE MARKING	
	PDIP – N	Tube	SN74AHC367N	SN74AHC367N	
–40°C to 85°C	SOIC - D	Tube	SN74AHC367D	AHC367	
	3010 - 15	Tape and reel	SN74AHC367DR	Al 10307	
-40 C to 65 C	SSOP – DB	Tape and reel	SN74AHC367DBR	HA367	
	TSSOP – PW	Tape and reel	SN74AHC367PWR	HA367	
	TVSOP – DGV	Tape and reel	SN74AHC367DGVR	HA367	
	CDIP – J	Tube	SNJ54AHC367J	SNJ54AHC367J	
–55°C to 125°C	CFP – W	Tube	SNJ54AHC367W	SNJ54AHC367W	
	LCCC – FK	Tube	SNJ54AHC367FK	SNJ54AHC367FK	

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



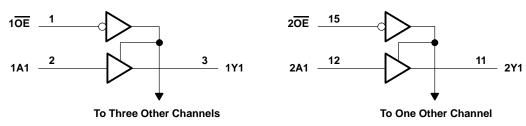
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# FUNCTION TABLE (each buffer/driver)

INP	JTS	OUTPUT
ŌĒ	Α	Y
L	Н	Н
L	L	L
Н	Χ	Z

#### logic diagram (positive logic)



Pin numbers shown are for the D, DB, DGV, J, N, PW, and W packages.

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

Supply voltage range, V <sub>CC</sub>		–0.5 V to 7 V
Input voltage range, V <sub>I</sub> (see Note 1)		–0.5 V to 7 V
Output voltage range, VO (see Note 1)		0.5 V to V <sub>CC</sub> + 0.5 V
Input clamp current, $I_{IK}$ ( $V_I < 0$ )		–20 mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CO}$	с)	±20 mA
Continuous output current, $I_O(V_O = 0 \text{ to } V_{CC})$		
Continuous current through V <sub>CC</sub> or GND		
Package thermal impedance, θ <sub>JA</sub> (see Note 2)		
,	DB package	
	DGV package	
	N package	
	PW package	108°C/W
Storage temperature range, T <sub>sta</sub>	. •	

<sup>†</sup> 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 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)

			SN54A	HC367	SN74A	HC367	UNIT
			MIN	MAX	MIN	MAX	UNII
Vcc	Supply voltage		2	5.5	2	5.5	V
		V <sub>CC</sub> = 2 V	1.5		1.5		
VIН	High-level input voltage	V <sub>CC</sub> = 3 V	2.1		2.1		V
		V <sub>CC</sub> = 5.5 V	3.85		3.85		
		V <sub>CC</sub> = 2 V		0.5		0.5	
VIL	Low-level input voltage	V <sub>CC</sub> = 3 V		0.9		0.9	V
		V <sub>CC</sub> = 5.5 V		1.65		1.65	
٧ <sub>I</sub>	Input voltage	-	0	5.5	0	5.5	V
٧o	Output voltage		9	Vcc	0	Vcc	V
		V <sub>CC</sub> = 2 V	30	-50		-50	μΑ
IOH	High-level output current	$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$	0,4	-4		-4	A
		$V_{CC} = 5 V \pm 0.5 V$		-8		-8	mA
		V <sub>CC</sub> = 2 V		50		50	μΑ
lOL	Low-level output current	$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$		4		4	mΛ
		$V_{CC} = 5 V \pm 0.5 V$		8		8	mA
Δt/Δν	Input transition rise or fall rate	$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$		100		100	ns/V
ΔυΔν	Input transition rise or fall rate	$V_{CC} = 5 V \pm 0.5 V$		20		20	HS/V
TA	Operating free-air temperature		-55	125	-40	85	°C

NOTE 3: All unused inputs of the device must be held at V<sub>CC</sub> 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)

DADAMETER	TEST COMPITIONS	V	T,	4 = 25°C	;	SN54A	HC367	SN74AI	HC367	UNIT
PARAMETER	TEST CONDITIONS	VCC	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
		2 V	1.9	2		1.9		1.9		
	I <sub>OH</sub> = -50 μA	3 V	2.9	3		2.9		2.9		
Voн		4.5 V	4.4	4.5		4.4		4.4		V
	$I_{OH} = -4 \text{ mA}$	3 V	2.58			2.48		2.48		
	I <sub>OH</sub> = -8 mA	4.5 V	3.94			3.8		3.8		
		2 V			0.1		0.1		0.1	
	I <sub>OL</sub> = 50 μA	3 V			0.1		0.1		0.1	
V <sub>OL</sub>		4.5 V			0.1		0.1		0.1	V
	I <sub>OL</sub> = 4 mA	3 V			0.36	(0)	0.5		0.44	
	I <sub>OL</sub> = 8 mA	4.5 V			0.36	Q <sub>C</sub>	0.5		0.44	
ΙĮ	V <sub>I</sub> = 5.5 V or GND	0 V to 5.5 V			±0.1	Q'	±1*		±1	μА
loz	$\frac{V_L}{OE} = V_{CC}$ or GND, $V_O = V_{CC}$ or GND,	5.5 V			±0.25		±2.5		±2.5	μΑ
Icc	$V_I = V_{CC}$ or GND, $I_O = 0$	5.5 V			4		40		40	μΑ
C <sub>i</sub>	V <sub>I</sub> = V <sub>CC</sub> or GND	5 V		3	10				10	pF
Co	$V_O = V_{CC}$ or GND	5 V		5.1	•				·	pF

<sup>\*</sup> On products compliant to MIL-PRF-38535, this parameter is not production tested at  $V_{CC} = 0 \text{ V}$ .



### SN54AHC367, SN74AHC367 HEX BUFFERS AND LINE DRIVERS WITH 3-STATE OUTPUTS

SCLS424E – JUNE 1998 – REVISED FEBRUARY 2002

# switching characteristics over recommended operating free-air temperature range, $V_{CC}$ = 3.3 V $\pm$ 0.3 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM	то	LOAD	T,	4 = 25°C	;	SN54Al	HC367	SN74AI	HC367	UNIT
PARAMETER	(INPUT)	(OUTPUT)	CAPACITANCE	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
<sup>t</sup> PLH	А	Y	C <sub>I</sub> = 15 pF		4.7*	8.3*	1*	10*	1	10	ns
<sup>t</sup> PHL	Α	'	C[ = 15 pr		4.7*	83*	1*	10*	1	10	115
<sup>t</sup> PZH	ŌĒ	Y	C <sub>L</sub> = 15 pF		5.1*	10.5*	1*	12.5*	1	12.5	ns
<sup>t</sup> PZL	OE	'	CL = 13 pr		5.1*	10.5*	1*	12.5*	1	12.5	110
<sup>t</sup> PHZ	ŌĒ	Y	C <sub>I</sub> = 15 pF		4*	10.5*	1*	12.5*	1	12.5	ns
<sup>t</sup> PLZ	OE	'	OL = 13 pi		4.9*	10.5*	1*	12.5*	1	12.5	113
<sup>t</sup> PLH	А	Y	C <sub>L</sub> = 50 pF		6.1	11.8	15	13.5	1	13.5	ns
<sup>t</sup> PHL	Α	'	CL = 30 pr		6.2	11.8	70	13.5	1	13.5	110
<sup>t</sup> PZH	ŌĒ	Y	C 50 pE		6.4	14	00/1	16	1	16	ns
<sup>t</sup> PZL	OE .	,	$C_L = 50 \text{ pF}$		6.8	14	1	16	1	16	115
<sup>t</sup> PHZ	ŌĒ	Y	C <sub>L</sub> = 50 pF		6.2	13.6	1	15.5	1	15.5	ns
<sup>t</sup> PLZ	OE .	<b>'</b>	O <sub>L</sub> = 30 μ		7.3	13.6	1	15.5	1	15.5	113

<sup>\*</sup> On products compliant to MIL-PRF-38535, this parameter is not production tested.

# switching characteristics over recommended operating free-air temperature range, $V_{CC}$ = 5 V $\pm$ 0.5 V (unless otherwise noted) (see Figure 1)

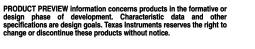
PARAMETER	FROM	то	LOAD	T,	չ = 25°C	;	SN54AI	HC367	SN74AI	HC367	UNIT
PARAMETER	(INPUT)	(OUTPUT)	CAPACITANCE	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
t <sub>PLH</sub>	А	Y	C <sub>L</sub> = 15 pF		3.4*	5.9*	1*	7*	1	7	ns
<sup>t</sup> PHL	^		GE = 13 bis		3.6*	5.9*	1*	7*	1	7	115
<sup>t</sup> PZH	ŌĒ	Y	C <sub>I</sub> = 15 pF		3.6*	7.2*	1*	8.5*	1	8.5	ns
<sup>t</sup> PZL	OE		OL = 13 pi		3.8*	7.2*	1*	8.5*	1	8.5	113
<sup>t</sup> PHZ	OE	Υ	C <sub>I</sub> = 15 pF		2.6*	7.2*	0*	8.5*	0	8.5	ns
<sup>t</sup> PLZ	OE	,	OL = 13 pi		2.6*	7.2*	0*	8.5*	0	8.5	115
<sup>t</sup> PLH	А	Y	C <sub>I</sub> = 50 pF		4.3	7.9	15	9	1	9	ns
<sup>t</sup> PHL	A	ī	CL = 50 pr		4.5	7.9	70	9	1	9	115
<sup>t</sup> PZH	ŌĒ	Y	C <sub>L</sub> = 50 pF		4.6	9.2	20 1	10.5	1	10.5	ns
t <sub>PZL</sub>	OE		CL = 30 pr		4.9	9.2	1	10.5	1	10.5	115
<sup>t</sup> PHZ	ŌĒ	Y	C <sub>L</sub> = 50 pF		3.4	9.2	0	10.5	0	10.5	ns
t <sub>PLZ</sub>	OL .	1	OL = 30 pi		4.5	9.2	0	10.5	0	10.5	113

<sup>\*</sup> On products compliant to MIL-PRF-38535, this parameter is not production tested.

# noise characteristics, $V_{CC}$ = 5 V, $C_L$ = 50 pF, $T_A$ = 25°C (see Note 4)

	PARAMETER	SN7	SN74AHC367				
	PARAMETER	MIN	TYP	MAX	UNIT		
V <sub>OL(P)</sub>	Quiet output, maximum dynamic V <sub>OL</sub>		0.9		V		
V <sub>OL(V)</sub>	Quiet output, minimum dynamic V <sub>OL</sub>		-0.8		V		
VOH(V)	Quiet output, minimum dynamic VOH		4.2		V		
V <sub>IH(D)</sub>	High-level dynamic input voltage	3.5			V		
V <sub>IL(D)</sub>	Low-level dynamic input voltage			1.5	V		

NOTE 4: Characteristics are for surface-mount packages only.

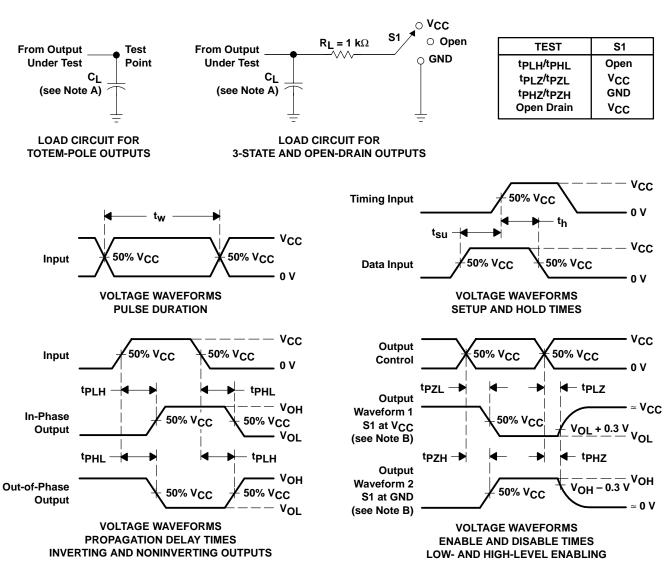




### operating characteristics, $V_{CC} = 5 \text{ V}$ , $T_A = 25^{\circ}\text{C}$

	PARAMETER	TEST CO	ONDITIONS	TYP	UNIT	
C <sub>pd</sub>	Power dissipation capacitance	Outputs enabled	No load,	f = 1 MHz	22.4	pF

#### PARAMETER MEASUREMENT INFORMATION



- 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  $\leq$  1 MHz,  $Z_{O} = 50 \Omega$ ,  $t_{f} \leq$  3 ns.  $t_{f} \leq$  3 ns.
  - D. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms







10-Jun-2014

#### PACKAGING INFORMATION

Orderable Device	Status	Package Type	Package Drawing	Pins	Package Qty		Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Device Marking	Samples
	(1)		Drawing		Qty	(2)	(6)	(3)		(4/5)	
SN74AHC367D	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHC367	Samples
SN74AHC367DR	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHC367	Samples
SN74AHC367N	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-40 to 85	SN74AHC367N	Samples
SN74AHC367PWR	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HA367	Samples

(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) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

- (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/Ball Finish Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.



#### **PACKAGE OPTION ADDENDUM**

10-Jun-2014

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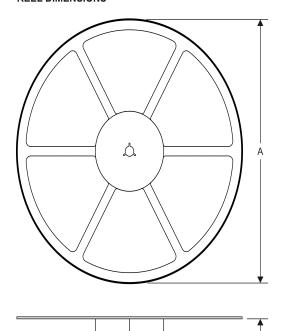
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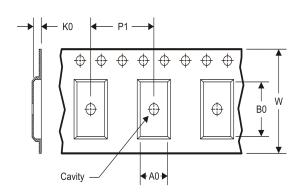
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#### TAPE AND REEL INFORMATION

#### **REEL DIMENSIONS**



#### **TAPE DIMENSIONS**



A0	Dimension designed to accommodate the component width
В0	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

#### TAPE AND REEL INFORMATION

#### \*All dimensions are nominal

Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74AHC367DR	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
SN74AHC367PWR	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1

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\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74AHC367DR	SOIC	D	16	2500	333.2	345.9	28.6
SN74AHC367PWR	TSSOP	PW	16	2000	367.0	367.0	35.0

# N (R-PDIP-T\*\*)

## PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- 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.



# D (R-PDS0-G16)

#### PLASTIC SMALL OUTLINE



- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
- Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
- E. Reference JEDEC MS-012 variation AC.



# D (R-PDSO-G16)

## PLASTIC SMALL OUTLINE



- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- D. 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. Refer to IPC-7525 for other stencil recommendations.
- E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



PW (R-PDSO-G16)

#### PLASTIC SMALL OUTLINE



- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M—1994.
- B. This drawing is subject to change without notice.
- Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
- Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
- E. Falls within JEDEC MO-153



# PW (R-PDSO-G16)

# PLASTIC SMALL OUTLINE



- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- D. 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. Refer to IPC-7525 for other stencil recommendations.
- E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



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