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- State-of-the-Art Advanced BiCMOS Technology (ABT) Widebus™ Design for 2.5-V and 3.3-V Operation and Low Static **Power Dissipation**
- Support Mixed-Mode Signal Operation (5-V Input and Output Voltages With 2.3-V to 3.6-V V_{CC})
- Typical V_{OLP} (Output Ground Bounce) < 0.8 V at V_{CC} = 3.3 V, T_A = 25°C
- High Drive (-24/24 mA at 2.5-V V_{CC} and -32/64 mA at 3.3-V V_{CC})
- Ioff and Power-Up 3-State Support Hot Insertion
- Use Bus Hold on Data Inputs in Place of External Pullup/Pulldown Resistors to Prevent the Bus From Floating

NOTE: For tape and reel order entry:

The GKER package is abbreviated to KR.

- **Auto3-State Eliminates Bus Current** Loading When Output Exceeds V_{CC} + 0.5 V
- Flow-Through Architecture Facilitates **Printed Circuit Board Layout**
- Distributed V_{CC} and GND Pin Configuration Minimizes High-Speed Switching Noise
- **ESD Protection Exceeds JESD-22**
 - 2000-V Human-Body Model
 - 200-V Machine Model (A115-A)
 - 1000-V Charged-Device Model (C101) (A114-A)
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II
- Packaged in Plastic Fine-Pitch Ball Grid Array Package

description

The 'ALVTH32374 devices are 32-bit edge-triggered D-type flip-flops with 3-state outputs designed for 2.5-V or 3.3-V) V_{CC} operation, but with the capability to provide a TTL interface to a 5-V system environment. These devices are particularly suitable for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

These devices can be used as four 8-bit flip-flops, two 16-bit flip-flops, or one 32-bit flip-flop. On the positive transition of the clock (CLK), the Q outputs of the flip-flops take on the logic levels set up at the data (D) inputs.

A buffered output-enable (\overline{OE}) input can be used to place the eight outputs in either a normal logic state (high or low logic levels) or the high-impedance state. In the high-impedance state, the outputs neither load nor drive the bus lines significantly. The high-impedance state and increased drive provide the capability to drive bus lines without interface or pullup components.

 $\overline{\sf OE}$ does not affect internal operations of the flip-flop. Old data can be retained or new data can be entered while the outputs are in the high-impedance state.

When V_{CC} is between 0 and 1.2 V, the device is in the high-impedance state during power up or power down. However, to ensure the high-impedance state above 1.2 V, $\overline{\sf OE}$ should be tied to $V_{\sf CC}$ through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

These devices are fully specified for hot-insertion applications using I_{off} and power-up 3-state. The I_{off} circuitry disables the outputs, preventing damaging current backflow through the device when they are powered down. The power-up 3-state circuitry places the outputs in the high-impedance state during power up and power down, which prevents driver conflict.

Active bus-hold circuitry is provided to hold unused or floating data inputs at a valid logic level.

The SN54ALVTH32374 is characterized for operation over the full military temperature range of -55°C to 125°C. The SN74ALVTH32374 is characterized for operation from –40°C to 85°C.



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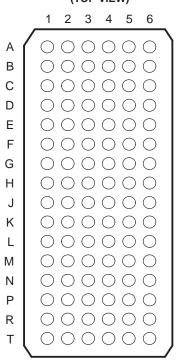


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FUNCTION TABLE (each flip-flop)

	INPUTS	OUTPUT	
OE	CLK	D	Q
L	1	Н	Н
L	\uparrow	L	L
L	H or L	Χ	Q_0
Н	Χ	Χ	Z

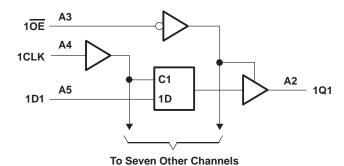
GKE PACKAGE (TOP VIEW)

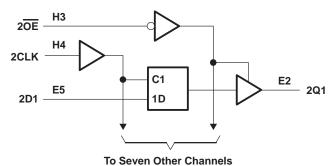


terminal assignments

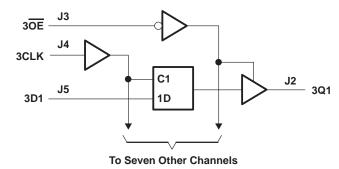
	1	2	3	4	5	6
Α	1Q2	1Q1	1OE	1CLK	1D1	1D2
В	1Q4	1Q3	GND	GND	1D3	1D4
С	1Q6	1Q5	1V _{CC}	1V _{CC}	1D5	1D6
D	1Q8	1Q7	GND	GND	1D7	1D8
E	2Q2	2Q1	GND	GND	2D1	2D2
F	2Q4	2Q3	1V _{CC}	1V _{CC}	2D3	2D4
G	2Q6	2Q5	GND	GND	2D5	2D6
Н	2Q7	2Q8	20E	2CLK	2D8	2D7
J	3Q2	3Q1	3OE	3CLK	3D1	3D2
K	3Q4	3Q3	GND	GND	3D3	3D4
L	3Q6	3Q5	2V _{CC}	2V _{CC}	3D5	3D6
М	3Q8	3Q7	GND	GND	3D7	3D8
N	4Q2	4Q1	GND	GND	4D1	4D2
Р	4Q4	4Q3	2V _{CC}	2V _{CC}	4D3	4D4
R	4Q6	4Q5	GND	GND	4D5	4D6
Т	4Q7	4Q8	4OE	4CLK	4D8	4D7

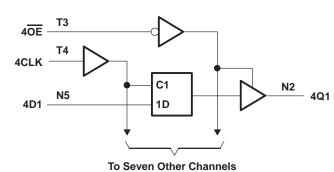
logic diagram (positive logic)





NOTE A: $1V_{CC}$ is associated with these channels.





NOTE B: 2V_{CC} is associated with these channels.

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)	\dots -0.5 V to 7 V
Voltage range applied to any output in the high-impedance or power-off state, VO	
(see Note 1)	\dots -0.5 V to 7 V
Voltage range applied to any output in the high state, V _O (see Note 1)	\dots -0.5 V to 7 V
Output current in the low state, IO: SN54ALVTH32374	96 mA
SN74ALVTH32374	128 mA
Output current in the high state, IO: SN54ALVTH32374	–48 mA
SN74ALVTH32374	–64 mA
Input clamp current, I _{IK} (V _I < 0)	–50 mA
Output clamp current, I _{OK} (V _O < 0)	–50 mA
Package thermal impedance, θ _{JA} (see Note 2)	40°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 and output negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.

^{2.} The package thermal impedance is calculated in accordance with JESD 51.

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recommended operating conditions, V_{CC} = 2.5 V \pm 0.2 V (see Note 3)

			SN54	ALVTH3	2374	SN74	ALVTH3	2374	UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	UNIT
Vcc	Supply voltage		2.3		2.7	2.3		2.7	V
VIH	High-level input voltage		1.7			1.7			V
V _{IL}	Low-level input voltage				0.7			0.7	V
VI	Input voltage		0	Vcc	5.5	0	VCC	5.5	V
loн	High-level output current			Q	-6			-8	mA
la.	Low-level output current			(0)	6			8	mA
lOL	Low-level output current; current duty cycle ≤ 5	50%; f ≥ 1 kHz		Q	18			24	IIIA
Δt/Δv	Input transition rise or fall rate	Outputs enabled	8)	10			10	ns/V
Δt/ΔV _{CC}	Power-up ramp rate		200			200			μs/V
TA	Operating free-air temperature		-55	•	125	-40		85	°C

NOTE 3: All unused control 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.

recommended operating conditions, V_{CC} = 3.3 V \pm 0.3 V (see Note 3)

			SN54	ALVTH3	2374	SN74	ALVTH3	2374	UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	UNIT
VCC	Supply voltage		3		3.6	3		3.6	V
VIH	High-level input voltage		2			2			V
V _{IL}	Low-level input voltage			Ü	0.8			0.8	V
VI	Input voltage		0	Vcc	5.5	0	VCC	5.5	V
loн	High-level output current			,Q	-24			-32	mA
1	Low-level output current			Ć)	24			32	mA
lOL	Low-level output current; current duty cycle ≤	50%; f≥1 kHz	200)	48			64	IIIA
Δt/Δν	Input transition rise or fall rate	Outputs enabled	20		10			10	ns/V
Δt/ΔVCC	Power-up ramp rate		200			200			μs/V
TA	Operating free-air temperature	·	-55		125	-40		85	°C

NOTE 3: All unused control 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.

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electrical characteristics over recommended operating free-air temperature range, V_{CC} = 2.5 V \pm 0.2 V (unless otherwise noted)

D/	ND AMETED	TEST OF	ONDITIONS	SN54	ALVTH3	2374	SN74	ALVTH3	2374	UNIT
P.F	ARAMETER	lESI CC	ONDITIONS	MIN	TYP [†]	MAX	MIN	TYP [†]	MAX	UNII
٧ıĸ		$V_{CC} = 2.3 \text{ V},$	I _I = -18 mA			-1.2			-1.2	V
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V},$	I _{OH} = -100 μA	VCC-0	2		VCC-0	.2		
VOH		V _{CC} = 2.3 V	$I_{OH} = -6 \text{ mA}$	1.8						V
		VCC = 2.3 V	$I_{OH} = -8 \text{ mA}$				1.8			
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V},$	I _{OL} = 100 μA			0.2			0.2	
			$I_{OL} = 6 \text{ mA}$			0.4				
VOL		V _{CC} = 2.3 V	$I_{OL} = 8 \text{ mA}$						0.4	V
		VCC = 2.5 V	$I_{OL} = 18 \text{ mA}$		0.5					
			$I_{OL} = 24 \text{ mA}$						0.5	
	Control inputs	$V_{CC} = 2.7 \text{ V},$	$V_I = V_{CC}$ or GND			±1			±1	
	Control inputs	$V_{CC} = 0 \text{ or } 2.7 \text{ V},$	V _I = 5.5 V			\$ 10			10	
lį			V _I = 5.5 V		Š	10			10	μΑ
	Data inputs	V _{CC} = 2.7 V	AI = ACC		77	1			1	
			V _I = 0		5	-5			– 5	
l _{off}		$V_{CC} = 0$,	V_I or $V_O = 0$ to 4.5 V		3				±100	μΑ
I _{BHL} ‡		$V_{CC} = 2.3 \text{ V},$	V _I = 0.7 V	000	115			115		μΑ
I _{BHH} §		$V_{CC} = 2.3 \text{ V},$	V _I = 1.7 V	Q"	-10			-10		μΑ
IBHLO		$V_{CC} = 2.7 \text{ V},$	$V_I = 0$ to V_{CC}	300			300			μΑ
Івннс) [#]	$V_{CC} = 2.7 \text{ V},$	$V_I = 0$ to V_{CC}	-300			-300			μΑ
{IEX}		$V{CC} = 2.3 \text{ V},$	$V_0 = 5.5 \text{ V}$			125			125	μΑ
IOZ(PI	J/PD)☆	$V_{CC} \le 1.2 \text{ V}, V_{O} = \frac{0.5}{\text{OE}} \text{ V}$ V _I = GND or V _{CC} , $\overline{\text{OE}}$ =	to V _{CC} , don't care			±100			±100	μΑ
lozh		V _{CC} = 2.7 V	$V_O = 2.3 \text{ V},$ $V_I = 0.7 \text{ V or } 1.7 \text{ V}$			5			5	μΑ
lozL		V _{CC} = 2.7 V	V _O = 0.5 V, V _I = 0.7 V or 1.7 V			- 5			-5	μΑ
		V _{CC} = 2.7 V,	Outputs high		0.04	0.1		0.04	0.1	
ICC		$I_{O} = 0$,	Outputs low		2.3	4.5		2.3	4.5	mA
		$V_I = V_{CC}$ or GND	Outputs disabled		0.04	0.1		0.04	0.1	
Ci		$V_{CC} = 2.5 \text{ V},$	V _I = 2.5 V or 0		3.5			3.5		pF
Со		V _{CC} = 2.5 V,	V _O = 2.5 V or 0		6			6		pF

[†] All typical values are at $V_{CC} = 2.5 \text{ V}$, $T_A = 25^{\circ}\text{C}$.



[‡] The bus-hold circuit can sink at least the minimum low sustaining current at V_{IL} max. I_{BHL} should be measured after lowering V_{IN} to GND and then raising it to V_{IL} max.

[§] The bus-hold circuit can source at least the minimum high sustaining current at VIH min. IBHH should be measured after raising VIN to VCC and then lowering it to VIH min.

 $[\]P$ An external driver must source at least IBHLO to switch this node from low to high.

[#] An external driver must sink at least I_{BHHO} to switch this node from high to low.

 $[\]parallel$ Current into an output in the high state when $V_O > V_{CC}$

^{*}High-impedance state during power up or power down

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electrical characteristics over recommended operating free-air temperature range, V_{CC} = 3.3 V \pm 0.3 V (unless otherwise noted)

PARAMETER		TEST CO	NUDITIONS	SN54	ALVTH3	2374	SN74	ALVTH3	2374	UNIT
PA	RAMETER	1531 CC	ONDITIONS	MIN	TYP [†]	MAX	MIN	TYP [†]	MAX	UNII
VIK		V _{CC} = 3 V,	I _I = -18 mA			-1.2			-1.2	V
		$V_{CC} = 3 \text{ V to } 3.6 \text{ V},$	I _{OH} = -100 μA	V _{CC} -0	.2		VCC-0	.2		
Vон		V _{CC} = 3 V	I _{OH} = -24 mA	2						V
		ACC = 2 A	$I_{OH} = -32 \text{ mA}$				2			
		$V_{CC} = 3 \text{ V to } 3.6 \text{ V},$	I _{OL} = 100 μA			0.2			0.2	
			I _{OL} = 16 mA						0.4	
VOL			$I_{OL} = 24 \text{ mA}$			0.5				V
VOL		V _{CC} = 3 V	I _{OL} = 32 mA						0.5	V
			$I_{OL} = 48 \text{ mA}$			0.55				
	_		$I_{OL} = 64 \text{ mA}$						0.55	
	Control inputs	$V_{CC} = 3.6 \text{ V},$	$V_I = V_{CC}$ or GND			±1			±1	
	Control inputs	$V_{CC} = 0 \text{ or } 3.6 \text{ V},$	V _I = 5.5 V			10			10	
Ц			V _I = 5.5 V			10			10	μΑ
	Data inputs	V _{CC} = 3.6 V	VI = VCC			1			1	
			V _I = 0		Jy.	- 5			– 5	
l _{off}		$V_{CC} = 0$,	V_I or $V_O = 0$ to 4.5 V		Q				±100	μΑ
I _{BHL} ‡		$V_{CC} = 3 V$,	V _I = 0.8 V	75	Ċ.		75			μΑ
I _{BHH} §		$V_{CC} = 3 V$,	V _I = 2 V	-75	2		-75			μΑ
IBHLO		$V_{CC} = 3.6 \text{ V},$	$V_I = 0$ to V_{CC}	500			500			μΑ
Івнно [‡]	#	$V_{CC} = 3.6 \text{ V},$	$V_I = 0$ to V_{CC}	-500			-500			μΑ
{IEX}		$V{CC} = 3 V$,	$V_0 = 5.5 \text{ V}$			125			125	μΑ
I _{OZ(PU}	/PD) [☆]	$V_{CC} \le 1.2 \text{ V}, V_{O} = \frac{0.5}{OE} \text{ V}$ $V_{I} = \text{GND or } V_{CC}, \overline{OE} = \frac{0.5}{OE} \text{ V}$	to V _{CC} , don't care			±100			±100	μΑ
lozh		V _{CC} = 3.6 V	V _O = 3 V, V _I = 0.8 V or 2 V			5			5	μΑ
lozL		V _{CC} = 3.6 V	V _O = 0.5 V, V _I = 0.8 V or 2 V			- 5			-5	μΑ
		V _{CC} = 3.6 V,	Outputs high		0.07	0.1		0.07	0.1	
ICC		$I_{O} = 0$,	Outputs low		3.2	5		3.2	5	mA
		$V_I = V_{CC}$ or GND	Outputs disabled		0.07	0.1		0.07	0.1	
∆lcc□		V _{CC} = 3 V to 3.6 V, One Other inputs at V _{CC} or 0				0.4			0.4	mA
Ci		V _{CC} = 3.3 V,	V _I = 3.3 V or 0		3.5			3.5		pF
Со		V _{CC} = 3.3 V,	V _O = 3.3 V or 0		6			6		pF

[†] All typical values are at $V_{CC} = 3.3 \text{ V}$, $T_A = 25^{\circ}\text{C}$.



[‡] The bus-hold circuit can sink at least the minimum low sustaining current at V_{IL} max. I_{BHL} should be measured after lowering V_{IN} to GND and then raising it to V_{IL} max.

[§] The bus-hold circuit can source at least the minimum high sustaining current at VIH min. IBHH should be measured after raising VIN to VCC and then lowering it to VIH min.

[¶] An external driver must source at least I_{BHLO} to switch this node from low to high.

[#] An external driver must sink at least IBHHO to switch this node from high to low.

 $[\]parallel$ Current into an output in the high state when $\vee_{O} > \vee_{CC}$

[★]High-impedance state during power up or power down

[☐] This is the increase in supply current for each input that is at the specified TTL voltage level rather than VCC or GND.

timing requirements over recommended operating free-air temperature range, V_{CC} = 2.5 V \pm 0.2 V (unless otherwise noted) (see Figure 1)

			SN54ALV	ГН32374	SN74ALVT	H32374	UNIT
			MIN	MAX	MIN	MAX	UNII
fclock	Clock frequency			150		150	MHz
t _W	Pulse duration, CLK high or low		1.5	FL	1.5		ns
	Octors the contests to force OLIVA	Data high			1		
t _{su}	Setup time, data before CLK↑	Data low	1.4		1.3		ns
.	Hald time a data often OLKA	Data high	0.6		0.5		no
t _h	Hold time, data after CLK↑	Data low	0.9	·	0.8		ns

timing requirements over recommended operating free-air temperature range, V_{CC} = 3.3 V \pm 0.3 V (unless otherwise noted) (see Figure 2)

			SN54ALVT	H32374	SN74ALVT	H32374	UNIT
			MIN	MAX	MIN	MAX	UNIT
fclock	Clock frequency			250		250	MHz
t _W	Pulse duration, CLK high or low		1.5		1.5		ns
	Out on the state to form OLKA	Data high		Ç	1		
t _{su}	Setup time, data before CLK↑	Data low	1.6		1.5		ns
+.	Hold time data after CLV [↑]	Data high	0.6	·	0.5		ns
^t h	Hold time, data after CLK↑	Data low	2 1.1	·	1		115

switching characteristics over recommended operating free-air temperature range, C_L = 30 pF, V_{CC} = 2.5 V \pm 0.2 V (unless otherwise noted) (see Figure 1)

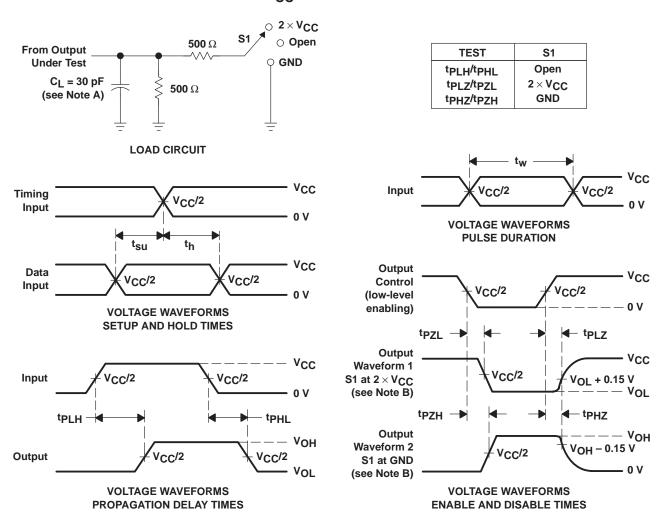
PARAMETER	FROM	то	SN54ALVTH323	74	SN74ALVTI	H32374	UNIT
PARAMETER	(INPUT)	(OUTPUT)	MIN M	AX	MIN	MAX	UNIT
f _{max}			150		150		MHz
t _{PLH}	CLK	Q	1.4	3.9	1.5	3.8	ns
^t PHL	CLN	α	1.4	3.9	1.5	3.8	115
^t PZH	ŌĒ	Q	1/.	4.2	1	4.1	ns
^t PZL	OE	ά	79	3.8	1	3.7	115
^t PHZ	ŌĒ	Q	1 .7	4.3	1.8	4.2	ns
^t PLZ	OE	3	2 1	3.5	1	3.4	115

switching characteristics over recommended operating free-air temperature range, C_L = 50 pF, V_{CC} = 3.3 V \pm 0.3 V (unless otherwise noted) (see Figure 2)

PARAMETER	FROM	то	SN54ALVTH32374	SN74ALVTH32374	UNIT
PARAMETER	(INPUT)	(OUTPUT)	MIN MAX	MIN MAX	I
f _{max}			250	250	MHz
^t PLH	CLK	Q	1 3.4	1 3.2	
^t PHL	CLN	α	1 3.3	1 3.2	ns
^t PZH	ŌĒ	Q	1 3.9	1 3.8	ns
tPZL	OE	α	3.4	1 3.3	115
^t PHZ	ŌĒ	Q	0 1 4.7	1 4.6	ns
t _{PLZ}	OE .	ζ	1 4.4	1 4.2] ''5



PARAMETER MEASUREMENT INFORMATION $V_{CC} = 2.5 \text{ V} \pm 0.2 \text{ V}$



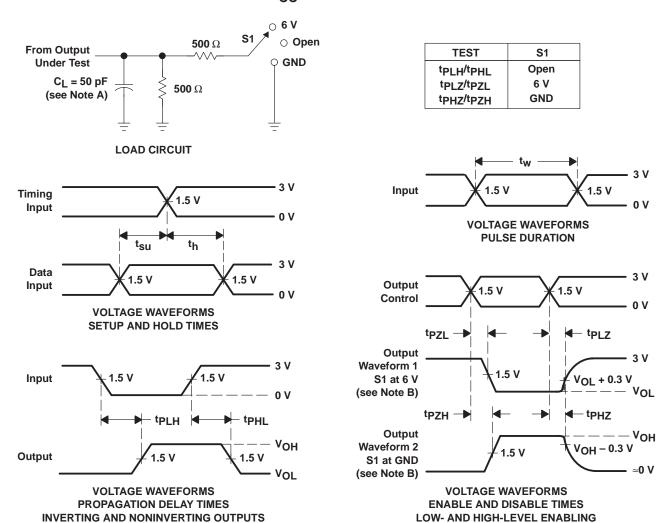
NOTES: A. C_L includes probe and jig capacitance.

- 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 MHz, $Z_Q = 50 \Omega$, $t_f \leq 2$ ns, $t_f \leq 2$ ns.
- D. The outputs are measured one at a time with one transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms



PARAMETER MEASUREMENT INFORMATION $V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$



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 MHz, $Z_Q = 50 \,\Omega$, $t_f \leq$ 2.5 ns, $t_f \leq$ 2.5 ns.
- D. The outputs are measured one at a time with one transition per measurement.

Figure 2. Load Circuit and Voltage Waveforms





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PACKAGING INFORMATION

Ord	derable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	e Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
74AL	VTH32374ZKER	ACTIVE	LFBGA	ZKE	96	1000	Green (RoHS & no Sb/Br)	SNAGCU	Level-3-260C-168 HR
SN74	4ALVTH32374KR	NRND	LFBGA	GKE	96	1000	TBD	SNPB	Level-2-235C-1 YEAR

⁽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.

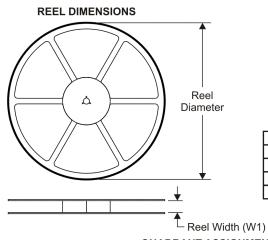
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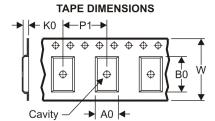
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PACKAGE MATERIALS INFORMATION

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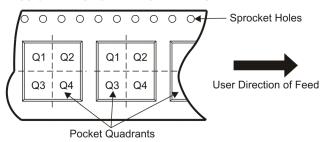
TAPE AND REEL INFORMATION





A0	Dimension designed to accommodate the component width
	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

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
74ALVTH32374ZKER	LFBGA	ZKE	96	1000	330.0	24.4	5.7	13.7	2.0	8.0	24.0	Q1
SN74ALVTH32374KR	LFBGA	GKE	96	1000	330.0	24.4	5.7	13.7	2.0	8.0	24.0	Q1

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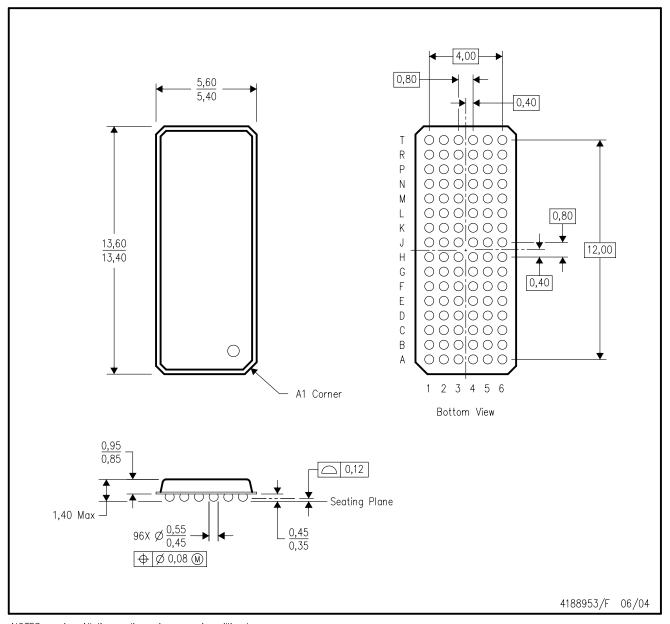


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
74ALVTH32374ZKER	LFBGA	ZKE	96	1000	333.2	345.9	31.8
SN74ALVTH32374KR	LFBGA	GKE	96	1000	333.2	345.9	31.8

GKE (R-PBGA-N96)

PLASTIC BALL GRID ARRAY



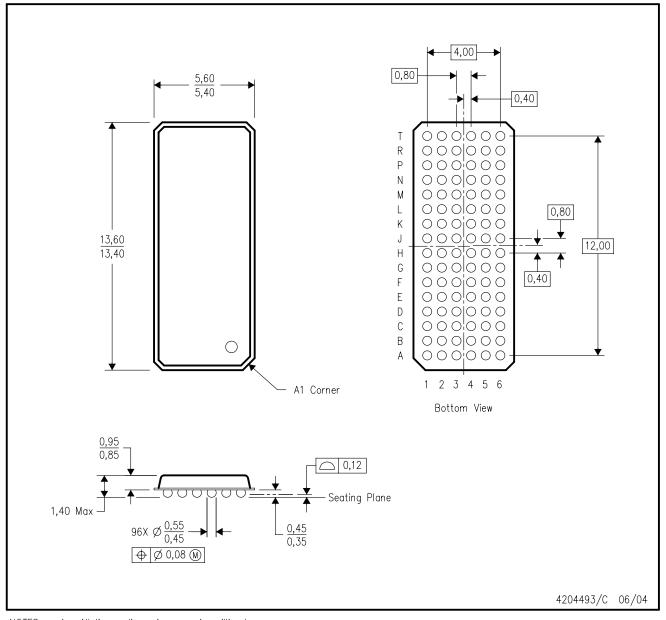
NOTES: A. All linear dimensions are in millimeters.

- B. This drawing is subject to change without notice.
- C. Falls within JEDEC MO-205 variation CC.
- D. This package is tin-lead (SnPb). Refer to the 96 ZKE package (drawing 4204493) for lead-free.



ZKE (R-PBGA-N96)

PLASTIC BALL GRID ARRAY



NOTES: A. All linear dimensions are in millimeters.

- B. This drawing is subject to change without notice.
- C. Falls within JEDEC MO-205 variation CC.
- D. This package is lead-free. Refer to the 96 GKE package (drawing 4188953) for tin-lead (SnPb).



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