

74ACT16254 16-BIT ADDRESS/DATA MULTIPLEXER WITH 3-STATE OUTPUTS

SCAS527A – AUGUST 1995 – NOVEMBER 1995

- Member of the Texas Instruments *Widebus™* Family
- Latch-Up Performance Exceeds 500 mA Per JEDEC Standard JESD-17
- Bus-Hold Inputs Eliminate the Need for External Pullup Resistors
- Typical V_{OLP} (Output Ground Bounce) < 0.8 V at $V_{CC} = 5$ V, $T_A = 25^\circ\text{C}$
- Distributed V_{CC} and GND Pin Configuration Minimizes High-Speed Switching Noise
- Packaged in Plastic Thin Shrink Small-Outline (DGG) Package

description

The 74ACT16254 is a dual 16-bit, noninverting bus-interface device. The A and C ports perform a transceiver function, like that of the 74ACT245. The B and C ports perform the buffer/driver function of the 74ACT244. The A and C port outputs are designed to sink up to 12 mA.

The 74ACT16254 is designed for asynchronous communication between data buses. The control function implementation minimizes external timing requirements.

Data transmission from the A port to the C port, C port to A port, or B port to C port is accomplished by setting the appropriate logic levels on the bus enable (EN1 and EN2) inputs.

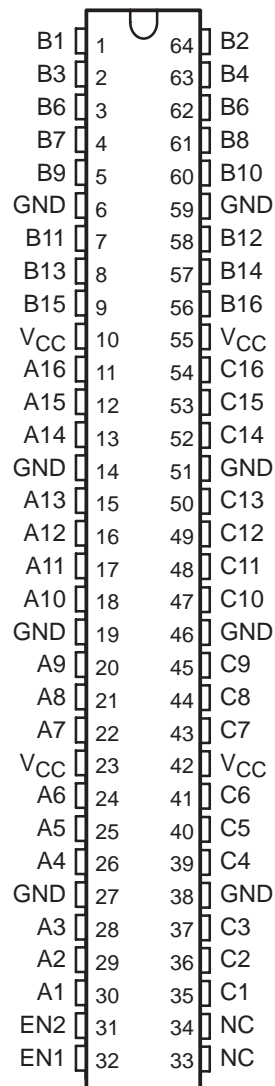
All outputs are disabled when logic highs are placed on both EN1 and EN2; the buses are effectively isolated.

The 74ACT16254 is packaged in TI's thin shrink small-outline package (DGG), which provides twice the I/O pin count and functionality of standard small-outline packages in the same printed-circuit-board area.

Active bus-hold circuitry is provided to hold unused or floating data and I/O pins at a valid logic level.

The 74ACT16254 is characterized for operation from -40°C to 85°C .

DGG PACKAGE
(TOP VIEW)



NC – No internal connection



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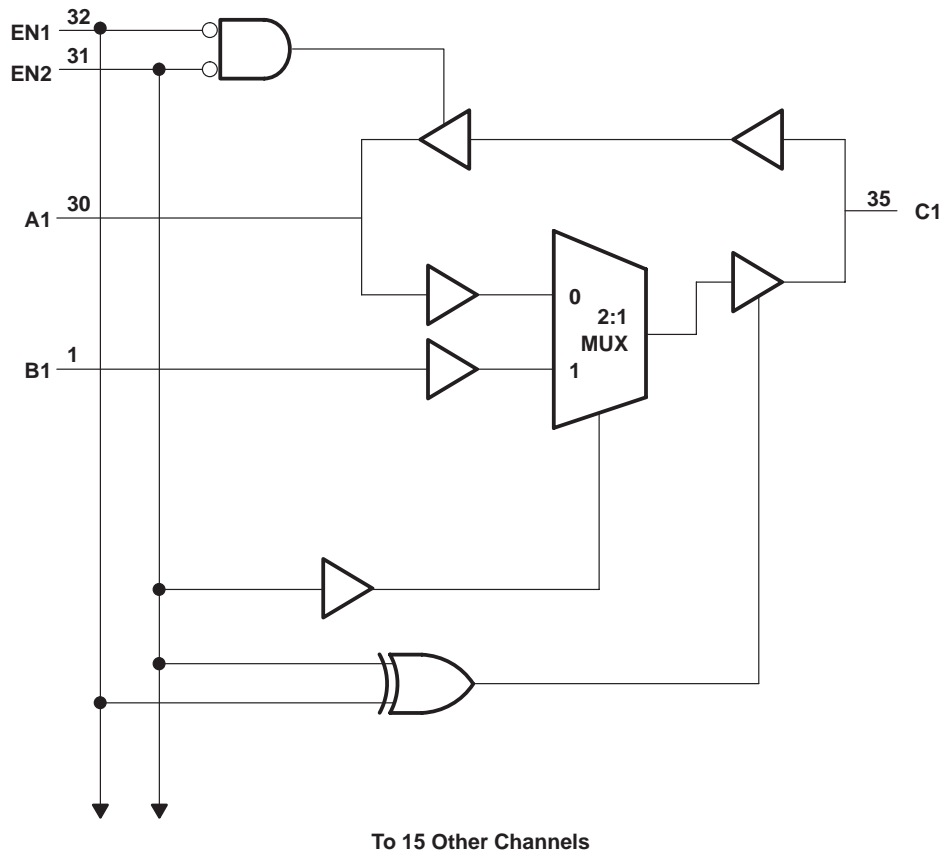
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FUNCTION TABLE

INPUTS		OPERATION
EN2	EN1	
H	H	Isolation
H	L	B data to C bus
L	H	A data to C bus
L	L	C data to A bus

logic diagram, each port (positive logic)



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

Supply voltage range, V_{CC}	–0.5 V to 7 V
Input voltage range, V_I (see Note 1)	–0.5 V to $V_{CC} + 0.5$ V
Output voltage range, V_O (see Note 1)	–0.5 V to $V_{CC} + 0.5$ V
Current into any output in the low state, I_O	50 mA
Input clamp current, I_{IK} ($V_I < 0$)	–50 mA
Output clamp current, I_{OK} ($V_O < 0$)	–50mA
Continuous current through V_{CC} or GND	±100 mA
Maximum power dissipation at $T_A = 55^\circ\text{C}$ (in still air) (see Note 2)	1 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 maximum package power dissipation is calculated using a junction temperature of 150°C and a board trace length of 750 mils.

recommended operating conditions (see Note 3)

	MIN	MAX	UNIT
V_{CC} Supply voltage	4.5	5.5	V
V_{IH} High-level input voltage	2		V
V_{IL} Low-level input voltage		0.8	V
V_I Input voltage	0	V_{CC}	V
I_{OH} High-level output current		–12	mA
I_{OL} Low-level output current		12	mA
$\Delta t/\Delta v$ Input transition rise or fall rate		10	ns/V
T_A Operating free-air temperature	–40	85	°C

NOTE 3: Unused inputs must be held high or low to prevent them from floating.



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

PARAMETER	TEST CONDITIONS		MIN	TYP†	MAX	UNIT
V_{IK}	$V_{CC} = 4.5\text{ V}$,	$I_I = -18\text{ mA}$			-1.2	V
V_{OH}	$V_{CC} = 4.5\text{ V}$,	$I_{OH} = -100\text{ }\mu\text{A}$	3			V
	$V_{CC} = 5.5\text{ V}$,	$I_{OH} = -100\text{ }\mu\text{A}$	4.2			
	$V_{CC} = 4.5\text{ V}$,	$I_{OH} = -12\text{ mA}$	3			
V_{OL}	$V_{CC} = 4.5\text{ V to } 5.5\text{ V}$,	$I_{OL} = 100\text{ }\mu\text{A}$			0.1	V
	$V_{CC} = 4.5\text{ V}$,	$I_{OL} = 12\text{ mA}$			0.4	
I_I	$V_{CC} = 5.5\text{ V}$,	$V_I = V_{CC}$ or GND	Inputs only		± 10	μA
I_{hold}	$V_{CC} = 4.5\text{ V}$,	$V_I = 2\text{ V}$	A, B, or C port		-100	μA
	$V_{CC} = 4.5\text{ V}$,	$V_I = 0.8\text{ V}$			100	
I_{OZ}^\ddagger	$V_{CC} = 5.5\text{ V}$,	$V_O = V_{CC}$ or GND			± 20	μA
I_{CC}	$V_{CC} = 5.5\text{ V}$,	$I_O = 0$, $V_I = V_{CC}$ or GND			50	μA
ΔI_{CC}^\S	$V_{CC} = 5.5\text{ V}$, Other inputs at V_{CC} or GND	One input at 3.4 V,			500	μA
C_i	$V_{CC} = 5\text{ V}$,	$V_I = V_{CC}$ or GND		3.5		pF
C_{io}	$V_{CC} = 5\text{ V}$,	$V_O = V_{CC}$ or GND		5		pF

† All typical values are at $T_A = 25^\circ\text{C}$.

‡ The parameter I_{OZ} includes the input-leakage current.

§ This is the increase in supply current for each input that is at the specified TTL voltage level rather than V_{CC} or GND.

switching characteristics over recommended ranges of supply voltage and operating free-air temperature, $C_L = 50\text{ pF}$ (unless otherwise noted) (see Figure 1)

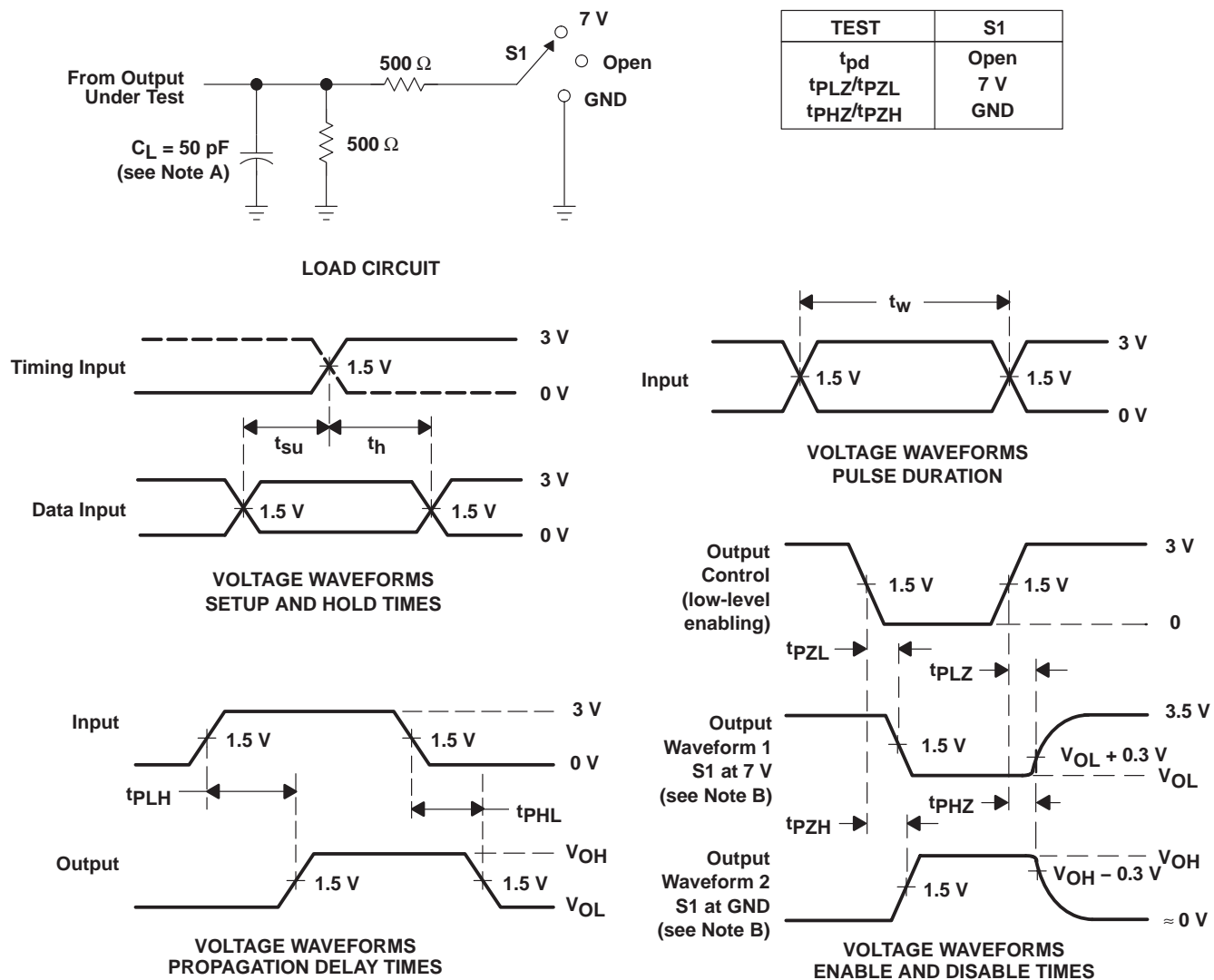
PARAMETER	FROM (INPUT)	TO (OUTPUT)	$T_A = 25^\circ\text{C}$			UNIT
			MIN	TYP	MAX	
t_{pd}	A or B	C	1.5	3.7	6.2	ns
t_{pd}	C	A	1.5	3.3	5.5	ns
t_{en}	EN1 or EN2	C	1.5	5.3	9.5	ns
t_{dis}	EN1 or EN2	C	1.5	4.4	8	ns
t_{en}	EN2	A	1.5	6.2	10.5	ns
t_{dis}	EN2	A	1.5	4.8	8	ns

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

PARAMETER		TEST CONDITIONS	TYP	UNIT
C_{pd}	Power dissipation capacitance	Outputs enabled	16	pF
		Outputs disabled	2	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: $PRR \leq 1 \text{ MHz}$, $Z_O = 50 \Omega$, $t_r \leq 2.5 \text{ ns}$, $t_f \leq 2.5 \text{ ns}$.
 - D. The outputs are measured one at a time with one input 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. t_{PHL} and t_{PLH} are the same as t_{pd} .

Figure 1. Load Circuit and Voltage Waveforms

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