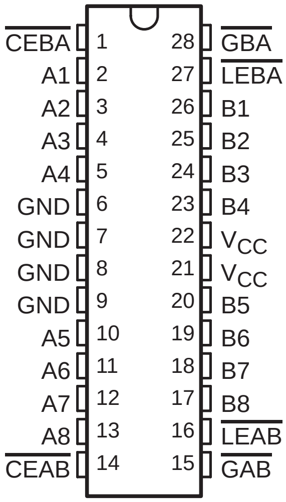
74ACT11544
OCTAL REGISTERED TRANSCEIVER WITH 3-STATE OUTPUTS

SCAS133 − D3609, JULY 1990 − REVISED APRIL 1993

- **Inputs Are TTL-Voltage Compatible**
- **3-State Inverted Outputs**
- **Back-to-Back Registers for Storage**
- **Flow-Through Architecture Optimizes PCB Layout**
- **Center-Pin V_{CC} and GND Configurations Minimize High-Speed Switching Noise**
- ***EPIC*™ (Enhanced-Performance Implanted CMOS) 1-µm Process**
- **500-mA Typical Latch-Up Immunity at 125°C**

DW PACKAGE
(TOP VIEW)



description

This 8-bit registered transceiver contains two sets of D-type latches for temporary storage of data flowing in either direction. Separate latch enable ($\overline{LEAB}$ or $\overline{LEBA}$) and output enable ($\overline{GAB}$ or $\overline{GBA}$) inputs are provided for each register to permit independent control in either direction of data flow. The 74ACT11544 inverts data in both directions.

The A-to-B enable ($\overline{CEAB}$) input must be low in order to enter data from A or to output data to B. Having $\overline{CEAB}$ low and $\overline{LEAB}$ low makes the A-to-B latches transparent; a subsequent low-to-high transition of $\overline{LEAB}$ puts the A latches in the storage mode. With $\overline{CEAB}$ and $\overline{GAB}$ both low, the 3-state B outputs are active and reflect the data present at the output of the A latches. Data flow from B-to-A is similar, but requires the use of $\overline{CEBA}$, $\overline{LEBA}$, and $\overline{GBA}$ inputs.

The 74ACT11544 is characterized for operation from −40°C to 85°C.

FUNCTION TABLE

INPUTS			LATCH STATUS A TO B[†]	OUTPUT BUFFERS B1 THRU B8
$\overline{CEAB}$	$\overline{LEAB}$	$\overline{GAB}$		
H	X	X	Storing	Z
X	H		Storing	
X		H		Z
L	L	L	Transparent	Current A Data
L	H	L	Storing	Previous[‡] A Data

[†] A-to-B data flow is shown: B-to-A flow control is the same except uses $\overline{CEBA}$, $\overline{LEBA}$, and $\overline{GBA}$.
[‡] Data present before low-to-high transition of $\overline{LEAB}$.

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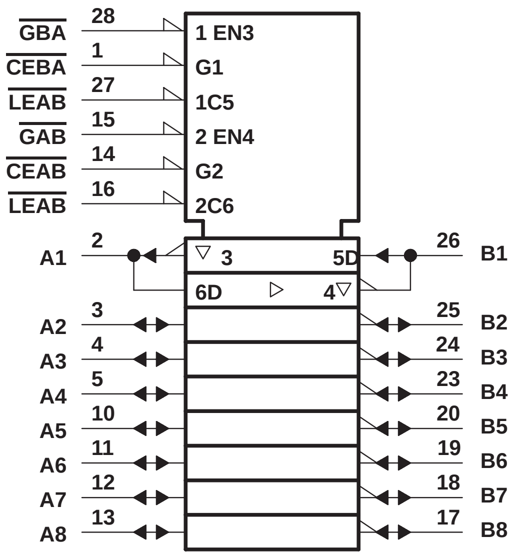
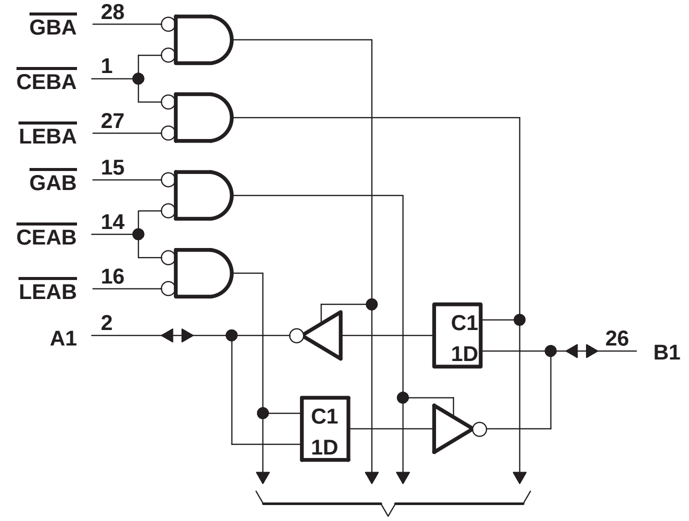
logic symbol[†]



[†] This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagram (positive logic)



To Seven Other Transceivers

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
Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$)	± 20 mA
Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$)	± 50 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC})	± 50 mA
Continuous current through V_{CC} or GND	± 200 mA
Storage temperature range	−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.

NOTE 1: The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

recommended operating conditions

		MIN	NOM	MAX	UNIT
V_{CC}	Supply voltage	4.5	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
V_O	Output voltage	0		V_{CC}	V
I_{OH}	High-level output current			−24	mA
I_{OL}	Low-level output current			24	mA
$\Delta t/\Delta v$	Input transition rise or fall rate	0		10	ns/V
T_A	Operating free-air temperature	− 40		85	°C

electrical characteristics over recommended operating free-air temperature range

PARAMETER		TEST CONDITIONS	V_{CC}	T_A = 25°C			MIN	MAX	UNIT
				MIN	TYP	MAX			
V_{OH}		I_{OH} = − 50 μA	4.5 V	4.4			4.4		V
			5.5 V	5.4			5.4		
		I_{OH} = − 24 mA	4.5 V	3.94			3.8		
			5.5 V	4.94			4.8		
		I_{OH} = − 75 mA[†]	5.5 V				3.85		
V_{OL}		I_{OL} = 50 μA	4.5 V			0.1		0.1	V
			5.5 V			0.1		0.1	
		I_{OL} = 24 mA	4.5 V			0.36		0.44	
			5.5 V			0.36		0.44	
		I_{OL} = 75 mA[†]	5.5 V					1.65	
I_I	Control inputs	V_I = V_{CC} or GND	5.5 V			± 0.1		± 1	μA
I_{OZ}	A or B ports[‡]	V_O = V_{CC} or GND	5.5 V			± 0.5		± 5	μA
I_{CC}		V_I = V_{CC} or GND, I_O = 0	5.5 V			8		80	μA
ΔI_{CC}[§]		One input at 3.4 V, Other inputs at GND or V_{CC}	5.5 V			0.9		1	mA
C_i	Control inputs	V_I = V_{CC} or GND	5 V		4.5				pF
C_o	A or B ports	V_O = V_{CC} or GND	5 V		12				pF

[†] Not more than one output should be tested at a time, and the duration of the test should not exceed 10 ms.
[‡] For I/O ports, the parameter I_{OZ} includes the input leakage current.
[§] This is the increase in supply current for each input that is at one of the specified TTL voltage levels rather than 0 V or V_{CC}.

timing requirements over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Figure 1)

			T_A = 25°C		MIN	MAX	UNIT
			MIN	MAX			
t_w	Pulse duration, $\overline{\text{LEAB}}$ or $\overline{\text{LEBA}}$ low		4		4		ns
t_{su}	Setup time	Data before $\overline{\text{LEAB}}$ or $\overline{\text{LEBA}}$↑	2.5		2.5		ns
		Data before $\overline{\text{CEAB}}$ or $\overline{\text{CEBA}}$↑	3		3		
t_h	Hold time	Data after $\overline{\text{LEAB}}$ or $\overline{\text{LEBA}}$↑	2		2		ns
		Data after $\overline{\text{CEAB}}$ or $\overline{\text{CEBA}}$↑	1.5		1.5		

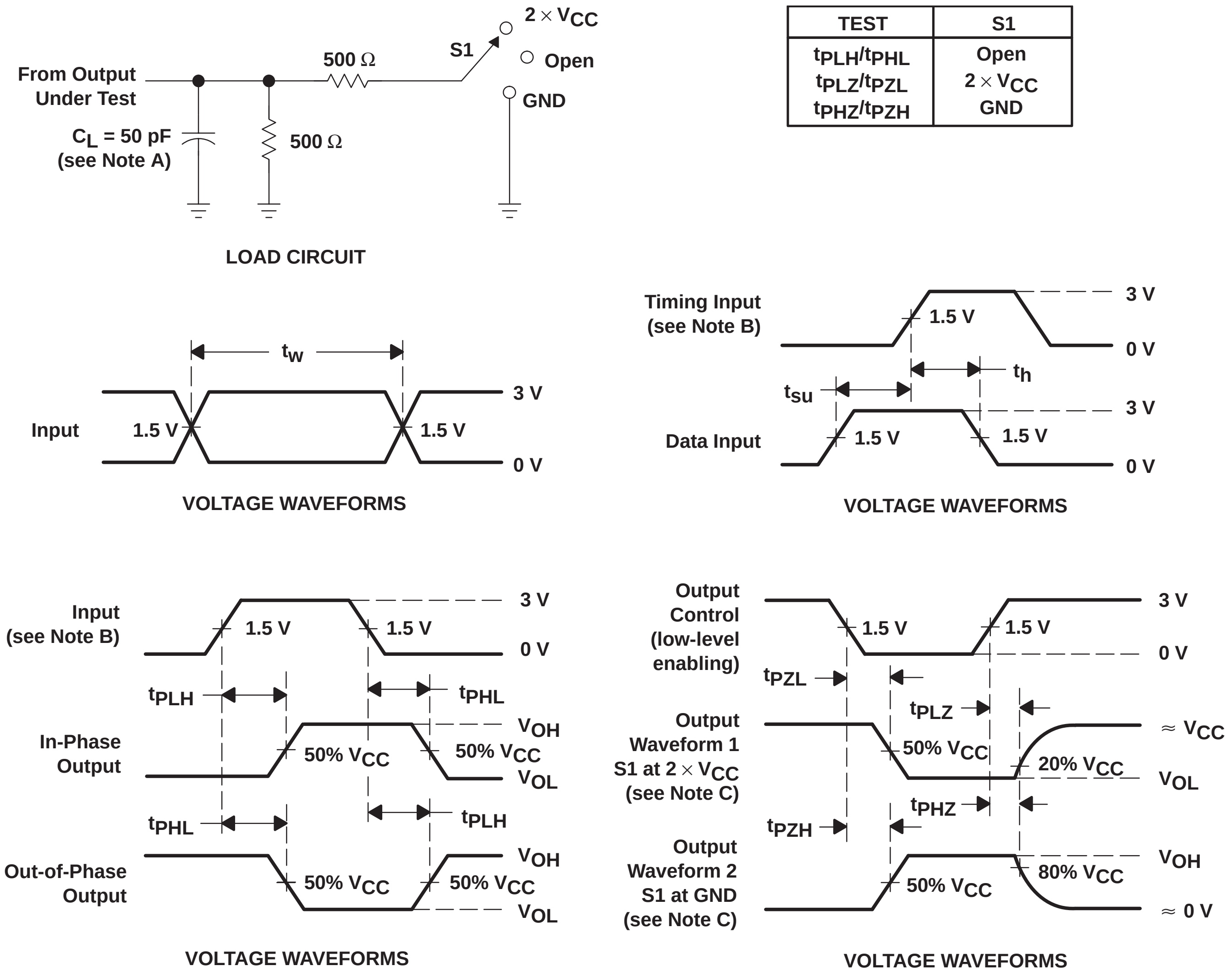
switching characteristics over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	T_A = 25°C			MIN	MAX	UNIT
			MIN	TYP	MAX			
t_{PLH}	A or B	B or A	2.4	5.7	8.2	2.4	8.9	ns
t_{PHL}			4.1	7.3	9.3	4.1	10.3	
t_{PLH}	$\overline{\text{LEBA}}$ or $\overline{\text{LEAB}}$	A or B	2.6	6	8.7	2.6	9.5	ns
t_{PHL}			3.4	7.1	10.1	3.4	11	
t_{PZH}	$\overline{\text{CEBA}}$ or $\overline{\text{CEAB}}$	A or B	3.3	6.7	9.5	3.3	10.4	ns
t_{PZL}			3.6	8.2	11.2	3.6	13	
t_{PHZ}	$\overline{\text{CEBA}}$ or $\overline{\text{CEAB}}$	A or B	4.8	7.6	9.7	4.8	10.4	ns
t_{PLZ}			4.7	7.6	9.5	4.7	10.2	
t_{PZH}	$\overline{\text{GBA}}$ or $\overline{\text{GAB}}$	A or B	3	6.4	9	3	9.9	ns
t_{PZL}			3.5	7.8	10.8	3.5	12.5	
t_{PHZ}	$\overline{\text{GBA}}$ or $\overline{\text{GAB}}$	A or B	4.6	7.3	9.3	4.6	9.9	ns
t_{PLZ}			4.6	7.2	9.2	4.6	9.7	

operating characteristics, V_{CC} = 5 V, T_A = 25°C

PARAMETER			TEST CONDITIONS	TYP	UNIT
C_{pd}	Power dissipation capacitance per transceiver	Outputs enabled	C_L = 50 pF, f = 1 MHz	47	pF
		Outputs disabled		14	

PARAMETER MEASUREMENT INFORMATION



TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	2 × V_{CC}
t_{PHZ}/t_{PZH}	GND

NOTES: A. C_L includes probe and jig capacitance.
B. All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50 Ω, t_r = 3 ns, t_f = 3 ns.
C. 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.
D. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)
74ACT11544DW	OBSOLETE	SOIC	DW	28		TBD	Call TI	Call TI
74ACT11544NT	OBSOLETE	PDIP	NT	28		TBD	Call TI	Call TI
74ACT11544NT	OBSOLETE	PDIP	NT	28		TBD	Call TI	Call TI

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

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS) 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.
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(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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