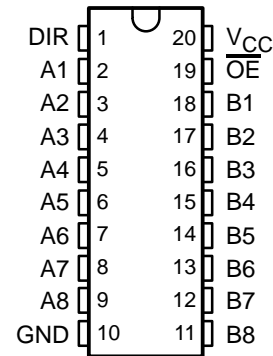


- **Controlled Baseline**
  - One Assembly/Test Site, One Fabrication Site
- **Extended Temperature Performance of –55°C to 125°C**
- **Enhanced Diminishing Manufacturing Sources (DMS) Support**
- **Enhanced Product-Change Notification**
- **Qualification Pedigree†**
- **Operating Range 2-V to 5.5-V  $V_{CC}$**
- **Latch-Up Performance Exceeds 250 mA Per JESD 17**
- **ESD Protection Exceeds 1000 V Per MIL-STD-883C, Method 3015; Exceeds 100 V Using Machine Model ( $C = 200$  pF,  $R = 0$ )**

† Component qualification in accordance with JEDEC and industry standards to ensure reliable operation over an extended temperature range. This includes, but is not limited to, Highly Accelerated Stress Test (HAST) or biased 85/85, temperature cycle, autoclave or unbiased HAST, electromigration, bond intermetallic life, and mold compound life. Such qualification testing should not be viewed as justifying use of this component beyond specified performance and environmental limits.

**DW OR PW PACKAGE  
(TOP VIEW)**



## description/ordering information

The SN74AHC245 octal bus transceiver is designed for asynchronous two-way communication between data buses. The control-function implementation minimizes external timing requirements.

This device allows data transmission from the A bus to the B bus or from the B bus to the A bus, depending on the logic level at the direction-control (DIR) input. The output-enable ( $\overline{OE}$ ) input can be used to disable the device so that the buses effectively are isolated.

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.

## ORDERING INFORMATION

$T_A$	PACKAGE‡		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–55°C to 125°C	SOIC – DW	Tape and reel	SN74AHC245MDWREP	AHC245MEP
	TSSOP – PW	Tape and reel	SN74AHC245MPWREP	AHC245EP

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



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 **TEXAS  
INSTRUMENTS**

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## SCLS487A – MAY 2003 – REVISED JUNE 2003

INPUTS		OPERATION
OE	DIR	
L	L	B data to A bus
L	H	A data to B bus
H	X	Isolation

The logic diagram of the 74VHC147 decoder shows the internal circuitry. It includes two 3-input AND gates at the top, two inverters in the middle, and two more 3-input AND gates at the bottom. The inputs are DIR (pin 1), A1 (pin 2), and B1 (pin 18). The output of the top-right AND gate is labeled 19 and  $\overline{OE}$ . The output of the bottom-right AND gate is labeled 18 and B1. The outputs of the two bottom AND gates are grouped by a bracket and labeled "To Seven Other Channels".

**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): Control inputs	–0.5 V to 7 V
I/O, output voltage range, $V_O$ (see Note 1)	–0.5 V to $V_{CC} + 0.5$ V
Input clamp current, $I_{IK}$ ( $V_I < 0$ ): Control inputs	–20 mA
I/O, output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ )	±20 mA
Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ )	±25 mA
Continuous current through $V_{CC}$ or GND	±75 mA
Package thermal impedance, $\theta_{JA}$ (see Note 2): DW package	58°C/W
PW package	83°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 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 <sub>CC</sub>	Supply voltage		2	5.5	V	
V <sub>IH</sub>	High-level input voltage	V <sub>CC</sub> = 2 V	1.5		V	
		V <sub>CC</sub> = 3 V	2.1			
		V <sub>CC</sub> = 5.5 V	3.85			
V <sub>IL</sub>	Low-level input voltage	V <sub>CC</sub> = 2 V	0.5		V	
		V <sub>CC</sub> = 3 V	0.9			
		V <sub>CC</sub> = 5.5 V	1.65			
V <sub>I</sub>	Input voltage	$\overline{OE}$ or DIR	0	5.5	V	
V <sub>O</sub>	Output voltage	A or B	0	V <sub>CC</sub>	V	
I <sub>OH</sub>	High-level output current	V <sub>CC</sub> = 2 V	−50		μA	
		V <sub>CC</sub> = 3.3 V ± 0.3 V	−4			mA
		V <sub>CC</sub> = 5 V ± 0.5 V	−8			
I <sub>OL</sub>	Low-level output current	V <sub>CC</sub> = 2 V	50		μA	
		V <sub>CC</sub> = 3.3 V ± 0.3 V	4			mA
		V <sub>CC</sub> = 5 V ± 0.5 V	8			
Δt/Δv	Input transition rise or fall rate	V <sub>CC</sub> = 3.3 V ± 0.3 V	100		ns/V	
		V <sub>CC</sub> = 5 V ± 0.5 V	20			
T <sub>A</sub>	Operating free-air temperature		−55	125	°C	

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.

# SN74AHC245-EP

## OCTAL BUS TRANSCEIVER

### WITH 3-STATE OUTPUTS

SCLS487A – MAY 2003 – REVISED JUNE 2003

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

PARAMETER		TEST CONDITIONS	V <sub>CC</sub>	T <sub>A</sub> = 25°C			MIN	MAX	UNIT
				MIN	TYP	MAX			
V <sub>OH</sub>		I <sub>OH</sub> = -50 µA	2 V	1.9	2		1.9		V
			3 V	2.9	3		2.9		
			4.5 V	4.4	4.5		4.4		
		I <sub>OH</sub> = -4 mA	3 V	2.58			2.48		
		I <sub>OH</sub> = -8 mA	4.5 V	3.94			3.8		
V <sub>OL</sub>		I <sub>OL</sub> = 50 µA	2 V			0.1		0.1	V
			3 V			0.1		0.1	
			4.5 V			0.1		0.1	
		I <sub>OL</sub> = 4 mA	3 V			0.36		0.5	
		I <sub>OL</sub> = 8 mA	4.5 V			0.36		0.5	
I <sub>I</sub>	A or B inputs	V <sub>I</sub> = 5.5 V or GND	5.5 V			±0.1		±1	µA
	$\overline{\text{OE}}$ or DIR		0 V to 5.5 V			±0.1		±1	
I <sub>OZ</sub> <sup>†</sup>		V <sub>O</sub> = V <sub>CC</sub> or GND, V <sub>I</sub> (OE) = V <sub>IL</sub> or V <sub>IH</sub>	5.5 V			±0.25		±2.5	µA
I <sub>CC</sub>		V <sub>I</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0	5.5 V			4		40	µA
C <sub>i</sub>	$\overline{\text{OE}}$ or DIR	V <sub>I</sub> = V <sub>CC</sub> or GND	5 V		2.5	10			pF
C <sub>io</sub>	A or B inputs	V <sub>I</sub> = V <sub>CC</sub> or GND	5 V		4				pF

<sup>†</sup> The parameter I<sub>OZ</sub> includes the input leakage current.

switching characteristics over recommended operating free-air temperature range, V<sub>CC</sub> = 3.3 V ± 0.3 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	T <sub>A</sub> = 25°C			MIN	MAX	UNIT
				MIN	TYP	MAX			
t <sub>PLH</sub>	A or B	B or A	C <sub>L</sub> = 15 pF		5.8	8.4	1	10	ns
t <sub>PHL</sub>					5.8	8.4	1	10	
t <sub>PZH</sub>	$\overline{\text{OE}}$	A or B	C <sub>L</sub> = 15 pF		8.5	13.2	1	15.5	ns
t <sub>PZL</sub>					8.5	13.2	1	15.5	
t <sub>PHZ</sub>	$\overline{\text{OE}}$	A or B	C <sub>L</sub> = 15 pF		8.9	12.5	1	15.5	ns
t <sub>PLZ</sub>					8.9	12.5	1	15.5	
t <sub>PLH</sub>	A or B	B or A	C <sub>L</sub> = 50 pF		8.3	11.9	1	13.5	ns
t <sub>PHL</sub>					8.3	11.9	1	13.5	
t <sub>PZH</sub>	$\overline{\text{OE}}$	A or B	C <sub>L</sub> = 50 pF		11	16.7	1	19	ns
t <sub>PZL</sub>					11	16.7	1	19	
t <sub>PHZ</sub>	$\overline{\text{OE}}$	A or B	C <sub>L</sub> = 50 pF		11.5	15.8	1	18	ns
t <sub>PLZ</sub>					11.5	15.8	1	18	

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	T <sub>A</sub> = 25°C			MIN	MAX	UNIT
				MIN	TYP	MAX			
t <sub>PLH</sub>	A or B	B or A	C <sub>L</sub> = 15 pF	4	5.5	1	6.5	ns	
t <sub>PHL</sub>				4	5.5	1	6.5		
t <sub>PZH</sub>	OE	A or B	C <sub>L</sub> = 15 pF	5.8	8.5	1	10	ns	
t <sub>PZL</sub>				5.8	8.5	1	10		
t <sub>PHZ</sub>	OE	A or B	C <sub>L</sub> = 15 pF	5.6	7.8	1	9.2	ns	
t <sub>PLZ</sub>				5.6	7.8	1	9.2		
t <sub>PLH</sub>	A or B	B or A	C <sub>L</sub> = 50 pF	5.5	7.5	1	8.5	ns	
t <sub>PHL</sub>				5.5	7.5	1	8.5		
t <sub>PZH</sub>	OE	A or B	C <sub>L</sub> = 50 pF	7.3	10.6	1	12	ns	
t <sub>PZL</sub>				7.3	10.6	1	12		
t <sub>PHZ</sub>	OE	A or B	C <sub>L</sub> = 50 pF	7	9.7	1	11	ns	
t <sub>PLZ</sub>				7	9.7	1	11		

**noise characteristics,  $V_{CC} = 5\text{ V}$ ,  $C_L = 50\text{ pF}$ ,  $T_A = 25^\circ\text{C}$  (see Note 4)**

PARAMETER	MIN	TYP	MAX	UNIT
$V_{OL(P)}$ Quiet output, maximum dynamic $V_{OL}$		0.9		V
$V_{OL(V)}$ Quiet output, minimum dynamic $V_{OL}$		-0.9		V
$V_{OH(V)}$ Quiet output, minimum dynamic $V_{OH}$		4.3		V
$V_{IH(D)}$ High-level dynamic input voltage	3.5			V
$V_{IL(D)}$ 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 CONDITIONS	TYP	UNIT
$C_{pd}$ Power dissipation capacitance	No load, $f = 1\text{ MHz}$	14	pF

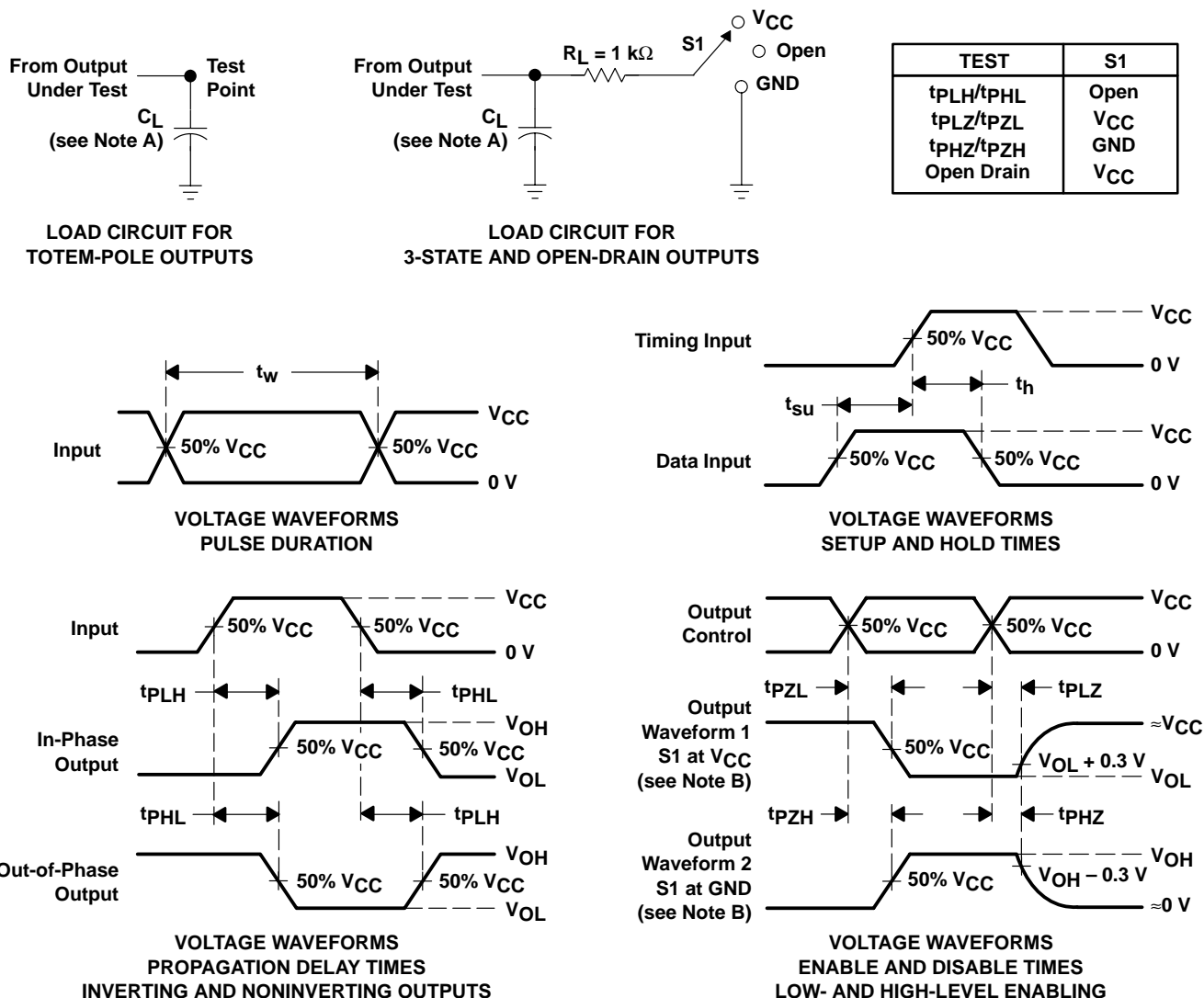
# SN74AHC245-EP

## OCTAL BUS TRANSCEIVER

### WITH 3-STATE OUTPUTS

SCLS487A – MAY 2003 – REVISED JUNE 2003

#### 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:  $PRR \leq 1\text{ MHz}$ ,  $Z_O = 50\ \Omega$ ,  $t_r \leq 3\text{ ns}$ ,  $t_f \leq 3\text{ ns}$ .
- 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)	Op Temp (°C)	Top-Side Markings (4)	Samples
SN74AHC245MDWREP	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	AHC245MEP	<a href="#">Samples</a>
SN74AHC245MDWREPG4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	AHC245MEP	<a href="#">Samples</a>
SN74AHC245MPWREP	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	AHC245EP	<a href="#">Samples</a>
V62/03650-01XE	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	AHC245EP	<a href="#">Samples</a>
V62/03650-01YE	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	AHC245MEP	<a href="#">Samples</a>

(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) Only one of markings shown within the brackets will appear on the physical device.

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**OTHER QUALIFIED VERSIONS OF SN74AHC245-EP :**

- Catalog: [SN74AHC245](#)
- Automotive: [SN74AHC245-Q1](#)
- Military: [SN54AHC245](#)

**NOTE:** Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects
- Military - QML certified for Military and Defense Applications



## TAPE AND REEL INFORMATION



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74AHC245MDWREP	SOIC	DW	20	2000	330.0	24.4	10.8	13.3	2.7	12.0	24.0	Q1
SN74AHC245MPWREP	TSSOP	PW	20	2000	330.0	16.4	6.95	7.1	1.6	8.0	16.0	Q1

## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74AHC245MDWREP	SOIC	DW	20	2000	367.0	367.0	45.0
SN74AHC245MPWREP	TSSOP	PW	20	2000	367.0	367.0	38.0

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