

SN54HCT245, SN74HCT245 OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

SCLS020E – MARCH 1984 – REVISED AUGUST 2003

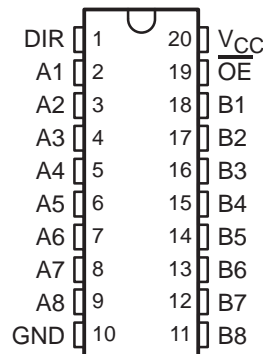
- Operating Voltage Range of 4.5 V to 5.5 V
- High-Current 3-State Outputs Drive Bus Lines Directly or Up To 15 LSTTL Loads
- Low Power Consumption, 80- μ A Max I_{CC}
- Typical $t_{pd} = 14$ ns
- ± 6 -mA Output Drive at 5 V
- Low Input Current of 1 μ A Max
- Inputs Are TTL-Voltage Compatible

description/ordering information

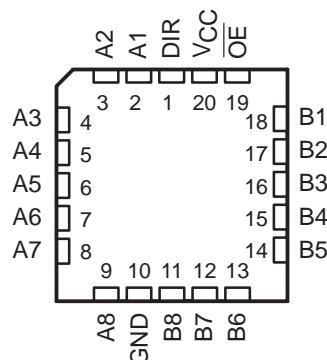
These octal bus transceivers are designed for asynchronous two-way communication between data buses. The control-function implementation minimizes external timing requirements.

The 'HCT245 devices allow data transmission from the A bus to the B bus or from the B bus to the A bus, depending upon 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 are effectively isolated.

SN54HCT245 . . . J OR W PACKAGE SN74HCT245 . . . DB, DW, N, NS, OR PW PACKAGE (TOP VIEW)



SN54HCT245 . . . FK PACKAGE (TOP VIEW)



ORDERING INFORMATION

TA	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
-40°C to 85°C	PDIP – N	Tube of 20	SN74HCT245N	SN74HCT245N
	SOIC – DW	Tube of 25	SN74HCT245DW	HCT245
		Reel of 2000	SN74HCT245DWR	
	SOP – NS	Reel of 2000	SN74HCT245NSR	HCT245
	SSOP – DB	Reel of 2000	SN74HCT245DBR	HT245
	TSSOP – PW	Tube of 70	SN74HCT245PW	HT245
Reel of 2000		SN74HCT245PWR		
Reel of 250		SN74HCT245PWT		
-55°C to 125°C	CDIP – J	Tube of 20	SNJ54HCT245J	SNJ54HCT245J
	CFP – W	Tube of 85	SNJ54HCT245W	SNJ54HCT245W
	LCCC – FK	Tube of 55	SNJ54HCT245FK	SNJ54HCT245FK

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



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

 **TEXAS
INSTRUMENTS**

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On products compliant to MIL-PRF-38535, all parameters are tested unless otherwise noted. On all other products, production processing does not necessarily include testing of all parameters.

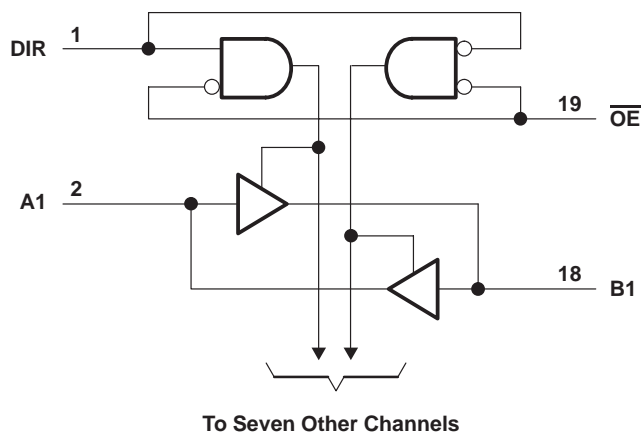
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FUNCTION TABLE

INPUTS		OPERATION
\overline{OE}	DIR	
L	L	B data to A bus
L	H	A data to B bus
H	X	Isolation

logic diagram (positive logic)



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

Supply voltage range, V_{CC}	-0.5 V to 7 V
Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$) (see Note 1)	± 20 mA
Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$) (see Note 1)	± 20 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC})	± 35 mA
Continuous current through V_{CC} or GND	± 70 mA
Package thermal impedance, θ_{JA} (see Note 2):	
DB package	70°C/W
DW package	58°C/W
N package	69°C/W
NS package	60°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.

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recommended operating conditions (see Note 3)

		SN54HCT245			SN74HCT245			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.5	5	5.5	V
V_{IH}	High-level input voltage	$V_{CC} = 4.5\text{ V to }5.5\text{ V}$		2	2		V	
V_{IL}	Low-level input voltage	$V_{CC} = 4.5\text{ V to }5.5\text{ V}$		0.8			V	
V_I	Input voltage	0	V_{CC}		0	V_{CC}		V
V_O	Output voltage	0	V_{CC}		0	V_{CC}		V
$\Delta t/\Delta v$	Input transition rise/fall time	500			500			ns
T_A	Operating free-air temperature	-55	125		-40	85		°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.

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

PARAMETER	TEST CONDITIONS		V_{CC}	$T_A = 25^\circ\text{C}$			SN54HCT245		SN74HCT245		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V_{OH}	$V_I = V_{IH}$ or V_{IL}	$I_{OH} = -20\ \mu\text{A}$	4.5 V	4.4	4.499	4.4	4.4		V		
		$I_{OH} = -6\ \text{mA}$		3.98	4.3		3.7	3.84			
V_{OL}	$V_I = V_{IH}$ or V_{IL}	$I_{OL} = 20\ \mu\text{A}$	4.5 V	0.001 0.1		0.1		0.1	V		
		$I_{OL} = 6\ \text{mA}$		0.17	0.26	0.4	0.33				
I_I	DIR or \overline{OE}	$V_I = V_{CC}$ or 0	5.5 V	± 0.1	± 100	± 1000	± 1000		nA		
I_{OZ}	A or B	$V_O = V_{CC}$ or 0	5.5 V	± 0.01	± 0.5	± 10	± 5		μA		
I_{CC}		$V_I = V_{CC}$ or 0, $I_O = 0$	5.5 V	8		160	80		μA		
ΔI_{CC}^\dagger		One input at 0.5 V or 2.4 V, Other inputs at 0 or V_{CC}	5.5 V	1.4	2.4	3	2.9		mA		
C_i^\ddagger	DIR or \overline{OE}		4.5 V to 5.5 V	3	10	10	10		pF		

[†] 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} .

[‡] Parameter C_i does not apply to transceiver I/O ports.

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}	$T_A = 25^\circ\text{C}$			SN54HCT245		SN74HCT245		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{pd}	A or B	B or A	4.5 V	16	22	33	28		ns		
			5.5 V	14	20	30	25				
t_{en}	\overline{OE}	A or B	4.5 V	25	46	69	58		ns		
			5.5 V	22	41	62	52				
t_{dis}	\overline{OE}	A or B	4.5 V	26	40	60	50		ns		
			5.5 V	23	36	54	45				
t_t		A or B	4.5 V	9	12	18	15		ns		
			5.5 V	8	11	16	14				



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**switching characteristics over recommended operating free-air temperature range, $C_L = 150$ pF
(unless otherwise noted) (see Figure 1)**

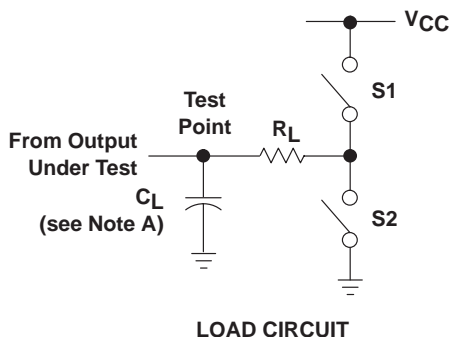
PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}	$T_A = 25^\circ\text{C}$			SN54HCT245		SN74HCT245		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{pd}	A or B	B or A	4.5 V	20	30	45	38	ns			
			5.5 V	18	27	41	34				
t_{en}	\overline{OE}	A or B	4.5 V	36	59	89	74	ns			
			5.5 V	30	53	80	67				
t_t		A or B	4.5 V	17	42	63	53	ns			
			5.5 V	14	38	57	48				

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

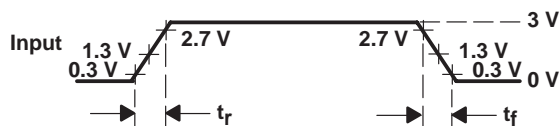
PARAMETER	TEST CONDITIONS	TYP	UNIT
C_{pd} Power dissipation capacitance per transceiver	No load	40	pF



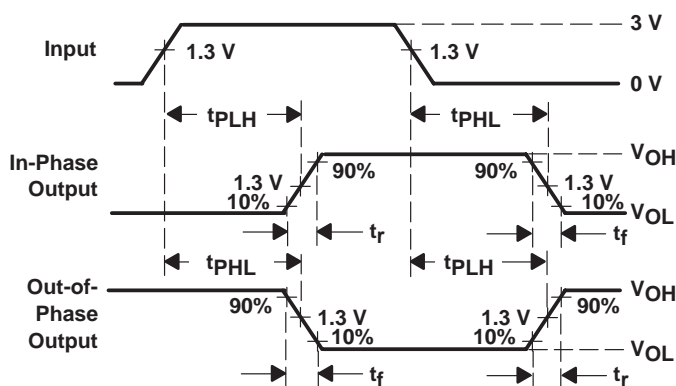
PARAMETER MEASUREMENT INFORMATION



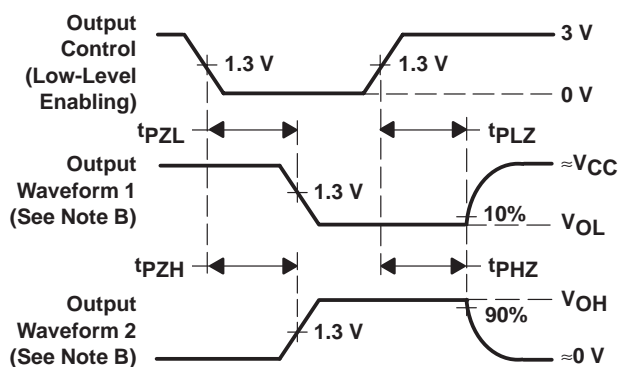
PARAMETER	R_L	C_L	S1	S2
t_{en}	1 k Ω	50 pF or 150 pF	Open	Closed
			Closed	Open
t_{dis}	1 k Ω	50 pF	Open	Closed
			Closed	Open
t_{pd} or t_t	—	50 pF or 150 pF	Open	Open



VOLTAGE WAVEFORM
INPUT RISE AND FALL TIMES



VOLTAGE WAVEFORMS
PROPAGATION DELAY AND OUTPUT RISE AND FALL TIMES



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES FOR 3-STATE OUTPUTS

- NOTES: A. C_L includes probe and test-fixture 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. Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics: PRR \leq 1 MHz, $Z_O = 50 \Omega$, $t_r = 6$ ns, $t_f = 6$ 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_{PLH} and t_{PHL} are the same as t_{pd} .

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⁾
5962-8550601VRA	ACTIVE	CDIP	J	20	1	TBD	Call TI	Level-NC-NC-NC
5962-8550601VSA	ACTIVE	CFP	W	20	1	TBD	Call TI	Level-NC-NC-NC
85506012A	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Level-NC-NC-NC
8550601RA	ACTIVE	CDIP	J	20	1	TBD	Call TI	Level-NC-NC-NC
JM38510/65553BRA	ACTIVE	CDIP	J	20	1	TBD	Call TI	Level-NC-NC-NC
JM38510/65553BSA	ACTIVE	CFP	W	20	1	TBD	Call TI	Level-NC-NC-NC
SN54HCT245J	ACTIVE	CDIP	J	20	1	TBD	Call TI	Level-NC-NC-NC
SN74HCT245DBLE	OBSOLETE	SSOP	DB	20		TBD	Call TI	Call TI
SN74HCT245DBR	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT245DBRE4	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT245DW	ACTIVE	SOIC	DW	20	25	Pb-Free (RoHS)	CU NIPDAU	Level-2-250C-1 YEAR/ Level-1-235C-UNLIM
SN74HCT245DWE4	ACTIVE	SOIC	DW	20	25	Pb-Free (RoHS)	CU NIPDAU	Level-2-250C-1 YEAR/ Level-1-235C-UNLIM
SN74HCT245DWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT245DWRE4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT245N	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74HCT245N3	OBSOLETE	PDIP	N	20		TBD	Call TI	Call TI
SN74HCT245NSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT245NSRE4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT245PW	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT245PWE4	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT245PWLE	OBSOLETE	TSSOP	PW	20		TBD	Call TI	Call TI
SN74HCT245PWR	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT245PWRG4	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT245PWT	ACTIVE	TSSOP	PW	20	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT245PWTE4	ACTIVE	TSSOP	PW	20	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SNJ54HCT245FK	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Level-NC-NC-NC
SNJ54HCT245J	ACTIVE	CDIP	J	20	1	TBD	Call TI	Level-NC-NC-NC
SNJ54HCT245W	ACTIVE	CFP	W	20	1	TBD	Call TI	Level-NC-NC-NC

⁽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