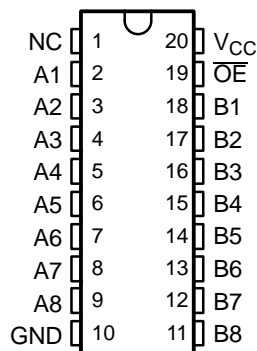


FEATURES

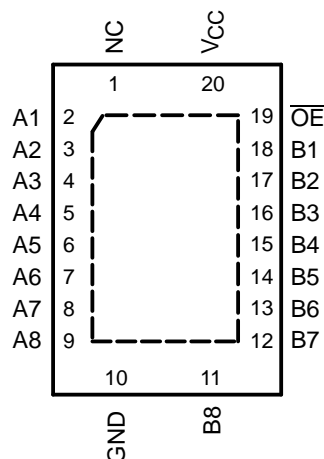
- Standard '245-Type Pinout
- 5-Ω Switch Connection Between Two Ports
- Rail-to-Rail Switching on Data I/O Ports
- I_{off} Supports Partial-Power-Down Mode Operation
- Latch-Up Performance Exceeds 250 mA Per JESD 17
- ESD Protection Exceeds JESD 22
 - 2000-V Human-Body Model (A114-A)
 - 200-V Machine Model (A115-A)

DBQ, DGV, DW, OR PW PACKAGE
(TOP VIEW)



NC - No internal connection

RGY PACKAGE
(TOP VIEW)



NC - No internal connection

DESCRIPTION/ORDERING INFORMATION

The SN74CBTLV3245A provides eight bits of high-speed bus switching in a standard '245 device pinout. The low on-state resistance of the switch allows connections to be made with minimal propagation delay.

The device is organized as one 8-bit switch. When output enable (\overline{OE}) is low, the 8-bit bus switch is on, and port A is connected to port B. When \overline{OE} is high, the switch is open, and the high-impedance state exists between the two ports.

This device is fully specified for partial-power-down applications using I_{off} . The I_{off} feature ensures that damaging current will not backflow through the device when it is powered down. The device has isolation during power off.

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 ⁽¹⁾		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–40°C to 85°C	QFN – RGY	Tape and reel	SN74CBTLV3245ARGYR	CL245A
	SOIC – DW	Tube	SN74CBTLV3245ADW	CBTLV3245A
		Tape and reel	SN74CBTLV3245ADWR	
	SSOP (QSOP) – DBQ	Tape and reel	SN74CBTLV3245ADBQR	CBTLV3245A
	TSSOP – PW	Tape and reel	SN74CBTLV3245APWR	CL245A
	TVSOP – DGV	Tape and reel	SN74CBTLV3245ADGVR	CL245A
	VFBGA – GQN	Tape and reel	SN74CBTLV3245AGQNR	CL245A
	VFBGA – ZQN	Tape and reel	SN74CBTLV3245AZQNR	CL245A

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



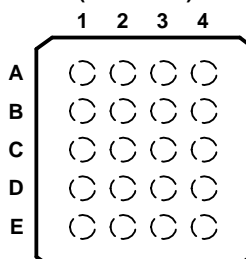
Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

SN74CBTLV3245A

LOW-VOLTAGE OCTAL FET BUS SWITCH

SCDS034M–JULY 1997–REVISED AUGUST 2005

**GQN OR ZQN PACKAGE
(TOP VIEW)**



TERMINAL ASSIGNMENTS⁽¹⁾

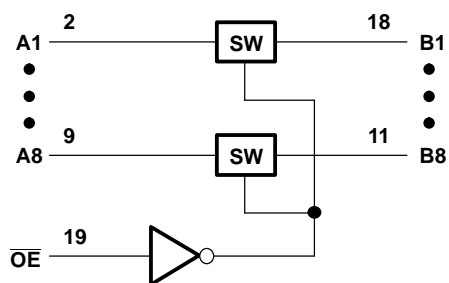
	1	2	3	4
A	A1	NC	V _{CC}	\overline{OE}
B	A3	B2	A2	B1
C	A5	A4	B4	B3
D	A7	B6	A6	B5
E	GND	A8	B8	B7

(1) NC - No internal connection

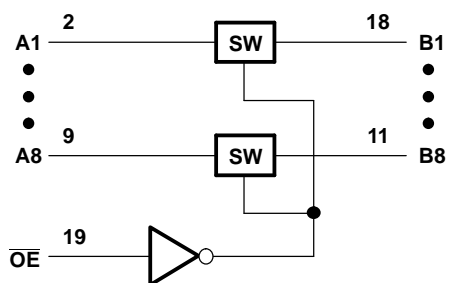
FUNCTION TABLE

INPUT \overline{OE}	FUNCTION
L	A port = B port
H	Disconnect

LOGIC DIAGRAM (POSITIVE LOGIC)



SIMPLIFIED SCHEMATIC, EACH FET SWITCH



Absolute Maximum Ratings⁽¹⁾

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

		MIN	MAX	UNIT
V_{CC}	Supply voltage range	–0.5	4.6	V
V_I	Input voltage range ⁽²⁾	–0.5	4.6	V
	Continuous channel current		128	mA
I_{IK}	Input clamp current	$V_{IO} < 0$	–50	mA
θ_{JA}	Package thermal impedance	DBQ package ⁽³⁾	68	°C/W
		DGV package ⁽³⁾	92	
		DW package ⁽³⁾	58	
		PW package ⁽³⁾	83	
		RGY package ⁽⁴⁾	37	
T_{stg}	Storage temperature range	–65	150	°C

- (1) 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.
- (2) The input and output negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
- (3) The package thermal impedance is calculated in accordance with JESD 51-7.
- (4) The package thermal impedance is calculated in accordance with JESD 51-5.

Recommended Operating Conditions⁽¹⁾

		MIN	MAX	UNIT
V_{CC}	Supply voltage	2.3	3.6	V
V_{IH}	High-level control input voltage	$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	1.7	V
		$V_{CC} = 2.7 \text{ V to } 3.6 \text{ V}$	2	
V_{IL}	Low-level control input voltage	$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	0.7	V
		$V_{CC} = 2.7 \text{ V to } 3.6 \text{ V}$	0.8	
T_A	Operating free-air temperature	–40	85	°C

- (1) 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.

SN74CBTLV3245A

LOW-VOLTAGE OCTAL FET BUS SWITCH

SCDS034M–JULY 1997–REVISED AUGUST 2005

Electrical Characteristics

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

PARAMETER		TEST CONDITIONS		MIN	TYP ⁽¹⁾	MAX	UNIT
V_{IK}	Control inputs	$V_{CC} = 3\text{ V}$,	$I_I = -18\text{ mA}$			–1.2	V
	Data inputs					–0.8	
I_I		$V_{CC} = 3.6\text{ V}$,	$V_I = V_{CC}\text{ or GND}$			± 60	μA
I_{off}		$V_{CC} = 0$,	$V_I\text{ or }V_O = 0\text{ to }3.6\text{ V}$			40	μA
I_{CC}		$V_{CC} = 3.6\text{ V}$,	$I_O = 0$,			20	μA
			$V_I = V_{CC}\text{ or GND}$				
$\Delta I_{CC}^{(2)}$	Control inputs	$V_{CC} = 3.6\text{ V}$,	One input at 3 V,			300	μA
			Other inputs at $V_{CC}\text{ or GND}$				
C_i	Control inputs	$V_I = 3\text{ V or }0$			4		pF
$C_{io(OFF)}$		$V_O = 3\text{ V or }0$, $\overline{OE} = V_{CC}$			9		pF
$r_{on}^{(3)}$	$V_{CC} = 2.3\text{ V}$, TYP at $V_{CC} = 2.5\text{ V}$	$V_I = 0$	$I_O = 64\text{ mA}$		5	8	Ω
			$I_O = 24\text{ mA}$		5	8	
		$V_I = 1.7\text{ V}$,	$I_O = 15\text{ mA}$		27	40	
	$V_{CC} = 3\text{ V}$	$V_I = 0$	$I_O = 64\text{ mA}$		5	7	
			$I_O = 24\text{ mA}$		5	7	
		$V_I = 2.4\text{ V}$,	$I_O = 15\text{ mA}$		10	15	

(1) All typical values are at $V_{CC} = 3.3\text{ V}$ (unless otherwise noted), $T_A = 25^\circ\text{C}$.

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

(3) Measured by the voltage drop between the A and B terminals at the indicated current through the switch. On-state resistance is determined by the lower of the voltages of the two (A or B) terminals.

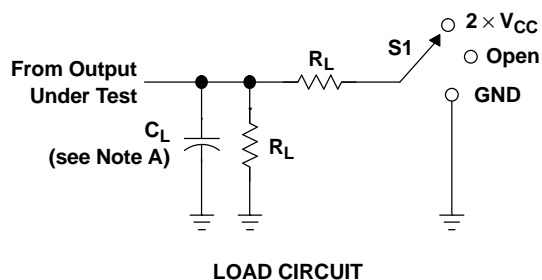
Switching Characteristics

over recommended operating free-air temperature range (unless otherwise noted) (see [Figure 1](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 2.5\text{ V}$ $\pm 0.2\text{ V}$		$V_{CC} = 3.3\text{ V}$ $\pm 0.3\text{ V}$		UNIT
			MIN	MAX	MIN	MAX	
$t_{pd}^{(1)}$	A or B	B or A		0.15		0.25	ns
t_{en}	\overline{OE}	A or B	1	6	1	4.7	ns
t_{dis}	\overline{OE}	A or B	1	6.1	1	6.4	ns

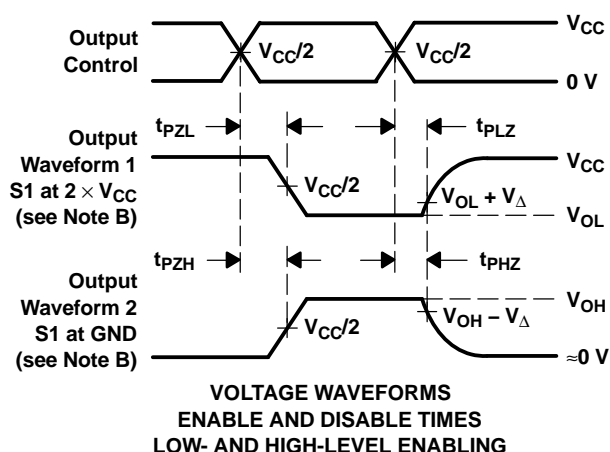
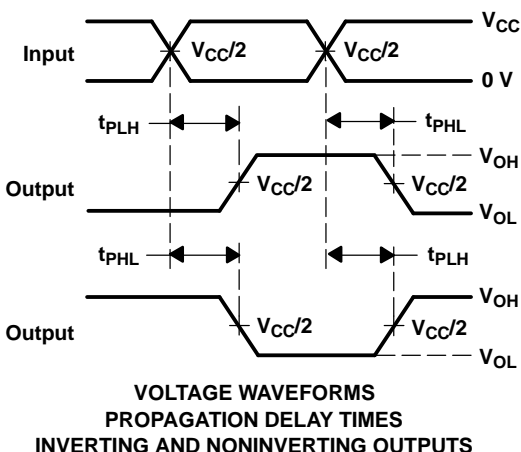
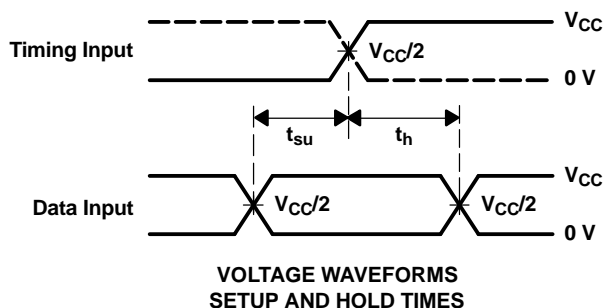
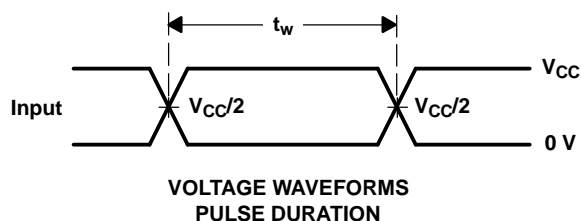
(1) The propagation delay is the calculated RC time constant of the typical on-state resistance of the switch and the specified load capacitance, when driven by an ideal voltage source (zero output impedance).

PARAMETER MEASUREMENT INFORMATION



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

V_{CC}	C_L	R_L	V_{Δ}
$2.5 \text{ V} \pm 0.2 \text{ V}$	30 pF	500 Ω	0.15 V
$3.3 \text{ V} \pm 0.3 \text{ V}$	50 pF	500 Ω	0.3 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 $\leq 10 \text{ MHz}$, $Z_O = 50 \Omega$, $t_r \leq 2 \text{ ns}$, $t_f \leq 2 \text{ ns}$.
D. The outputs are measured one at a time with one 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} .
H. All parameters and waveforms are not applicable to all devices.

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 (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
74CBTLV3245ADBQRE4	ACTIVE	SSOP	DBQ	20		TBD	Call TI	Call TI	-40 to 85		Samples
74CBTLV3245ADBQRG4	ACTIVE	SSOP	DBQ	20		TBD	Call TI	Call TI	-40 to 85		Samples
74CBTLV3245ADGVRE4	ACTIVE	TVSOP	DGV	20		TBD	Call TI	Call TI	-40 to 85		Samples
74CBTLV3245ADGVRG4	ACTIVE	TVSOP	DGV	20		TBD	Call TI	Call TI	-40 to 85		Samples
74CBTLV3245ADWG4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBTLV3245A	Samples
74CBTLV3245ADWRE4	ACTIVE	SOIC	DW	20		TBD	Call TI	Call TI	-40 to 85		Samples
74CBTLV3245ADWRG4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBTLV3245A	Samples
74CBTLV3245APWRE4	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CL245A	Samples
74CBTLV3245APWRG4	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CL245A	Samples
74CBTLV3245ARGYRG4	ACTIVE	VQFN	RGY	20		TBD	Call TI	Call TI	-40 to 85		Samples
SN74CBTLV3245ADBQR	ACTIVE	SSOP	DBQ	20	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	CBTLV3245A	Samples
SN74CBTLV3245ADGVR	ACTIVE	TVSOP	DGV	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CL245A	Samples
SN74CBTLV3245ADW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBTLV3245A	Samples
SN74CBTLV3245ADWE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBTLV3245A	Samples
SN74CBTLV3245ADWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBTLV3245A	Samples
SN74CBTLV3245APW	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CL245A	Samples
SN74CBTLV3245APWG4	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	CL245A	Samples
SN74CBTLV3245APWR	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU CU SN	Level-1-260C-UNLIM	-40 to 85	CL245A	Samples

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
SN74CBTLV3245ARGYR	ACTIVE	VQFN	RGY	20	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	CL245A	Samples
SN74CBTLV3245AZQNR	ACTIVE	BGA MICROSTAR JUNIOR	ZQN	20	1000	Green (RoHS & no Sb/Br)	SNAGCU	Level-1-260C-UNLIM	-40 to 85	CL245A	Samples

(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.

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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) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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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
SN74CBTLV3245ADBQR	SSOP	DBQ	20	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74CBTLV3245ADGVR	TVSOP	DGV	20	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74CBTLV3245ADWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.3	2.7	12.0	24.0	Q1
SN74CBTLV3245APWR	TSSOP	PW	20	2000	330.0	16.4	6.95	7.1	1.6	8.0	16.0	Q1
SN74CBTLV3245APWR	TSSOP	PW	20	2000	330.0	16.4	6.95	7.1	1.6	8.0	16.0	Q1
SN74CBTLV3245ARGYR	VQFN	RGY	20	3000	330.0	12.4	3.8	4.8	1.6	8.0	12.0	Q1
SN74CBTLV3245AZQNR	BGA MICROSTAR JUNIOR	ZQN	20	1000	330.0	12.4	3.3	4.3	1.6	8.0	12.0	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74CBTLV3245ADBQR	SSOP	DBQ	20	2500	367.0	367.0	38.0
SN74CBTLV3245ADGVR	TVSOP	DGV	20	2000	367.0	367.0	35.0
SN74CBTLV3245ADWR	SOIC	DW	20	2000	367.0	367.0	45.0
SN74CBTLV3245APWR	TSSOP	PW	20	2000	364.0	364.0	27.0
SN74CBTLV3245APWR	TSSOP	PW	20	2000	367.0	367.0	38.0
SN74CBTLV3245ARGYR	VQFN	RGY	20	3000	367.0	367.0	35.0
SN74CBTLV3245AZQNR	BGA MICROSTAR JUNIOR	ZQN	20	1000	338.1	338.1	20.6

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