



FEATURES

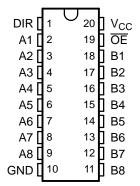
- Operates From 1.65 V to 3.6 V
- Max t_{pd} of 3.4 ns at 3.3 V
- ±24-mA Output Drive at 3.3 V
- Bus Hold on Data Inputs Eliminates the Need for External Pullup/Pulldown Resistors
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II

DESCRIPTION/ORDERING INFORMATION

This octal bus transceiver is designed for 1.65-V to 3.6-V $\mbox{V}_{\mbox{\footnotesize{CC}}}$ operation.

The SN74ALVCH245 is designed for asynchronous communication between data buses. The device transmits data 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 the buses are effectively isolated.

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



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.

Active bus-hold circuitry holds unused or undriven inputs at a valid logic state. Use of pullup or pulldown resistors with the bus-hold circuitry is not recommended.

ORDERING INFORMATION

T _A	PAC	KAGE ⁽¹⁾	ORDERABLE PART NUMBER	TOP-SIDE MARKING
	SOIC - DW		SN74ALVCH245DW	ALVOLI245
	SOIC - DW	Tape and reel	SN74ALVCH245DWR	ALVCH245
-40°C to 85°C	SOP - NS	Tape and reel	SN74ALVCH245NSR	ALVCH245
-40°C 10 65°C	TSSOP - PW	Tube	SN74ALVCH245PW	VB245
	1330P - PW	Tape and reel	SN74ALVCH245PWR	VB243
	TVSOP - DGV	Tape and reel	SN74ALVCH245DGVR	VB245

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

FUNCTION TABLE

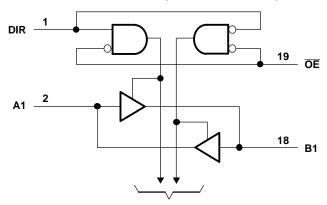
INP	UTS	OPERATION
OE	DIR	OPERATION
L	L	B data to A bus
L	Н	A data to B bus
Н	Χ	Isolation



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LOGIC DIAGRAM (POSITIVE LOGIC)



To Seven Other Channels

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	Innut voltage reage	Except I/O ports ⁽²⁾	-0.5	4.6	V
VI	Input voltage range	I/O ports ⁽²⁾⁽³⁾	-0.5	V _{CC} + 0.5	
Vo	Output voltage range ⁽²⁾⁽³⁾		-0.5	V _{CC} + 0.5	V
I _{IK}	Input clamp current	V _I < 0		-50	mA
I _{OK}	Output clamp current	V _O < 0		-50	mA
lo	Continuous output current			±50	mA
	Continuous current through V _{CC} or GND			±100	mA
		DGV package		92	
0	Declines the secol insection of (4)	DW package		58	− °C/W
θ_{JA}	Package thermal impedance ⁽⁴⁾	NS package		60	
		PW package		83	
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 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 permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions for extended periods may affect device reliability.

operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

(2) The input negative-voltage and output voltage ratings may be exceeded if the input and output current ratings are observed.

⁽³⁾ This value is limited to 4.6 V maximum.

⁽⁴⁾ The package thermal impedance is calculated in accordance with JESD 51-7.



SN74ALVCH245 OCTAL BUS TRANSCEIVER WITH 3-STATE OUTPUTS

RECOMMENDED OPERATING CONDITIONS(1)

			MIN	MAX	UNIT
V _{CC}	Supply voltage		1.65	3.6	V
		V _{CC} = 1.65 V to 1.95 V	0.65 × V _{CC}		
V_{IH}	High-level input voltage	$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	1.7		V
		V _{CC} = 2.7 V to 3.6 V	2		
		V _{CC} = 1.65 V to 1.95 V		$0.35 \times V_{CC}$	
V_{IL}	Low-level input voltage	$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$		0.7	V
		V _{CC} = 2.7 V to 3.6 V		0.8	
V _I	Input voltage		0	V _{CC}	V
Vo	Output voltage		0	V _{CC}	V
		V _{CC} = 1.65 V		-4	
	High lavel systems are and	V _{CC} = 2.3 V		-12	mA
I _{OH}	High-level output current	V _{CC} = 2.7 V		-12	
		V _{CC} = 3 V		-24	
		V _{CC} = 1.65 V		4	
	Laur laural austrust ausmant	V _{CC} = 2.3 V		12	A
I _{OL} Low-level output current	Low-level output current	$V_{CC} = 2.7 \text{ V}$		12	mA
		V _{CC} = 3 V		24	
Δt/Δν	Input transition rise or fall rate			10	ns/V
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.

SCES119G-JULY 1997-REVISED SEPTEMBER 2004



ELECTRICAL CHARACTERISTICS

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

PARAMETER	TEST CONDITIONS	V _{cc}	MIN	TYP ⁽¹⁾ MAX	UNIT
	I _{OH} = -100 μA	1.65 V to 3.6 V	V _{CC} - 0.2		
	$I_{OH} = -4 \text{ mA}$	1.65 V	1.2		
	$I_{OH} = -6 \text{ mA}$	2.3 V	2		
V _{OH}		2.3 V	1.7		V
	$I_{OH} = -12 \text{ mA}$	2.7 V	2.2		
		3 V	2.4		
	$I_{OH} = -24 \text{ mA}$	3 V	2		
	$I_{OL} = 100 \mu\text{A}$	1.65 V to 3.6 V		0.2	
	I _{OL} = 4 mA	1.65 V		0.45	
V _{OL}	I _{OL} = 6 mA	2.3 V		0.4	V
	L = 12 mΛ	2.3 V		0.7	V
	$I_{OL} = 12 \text{ mA}$	2.7 V		0.4	
	I _{OL} = 24 mA	3 V		0.55	
I _I	V _I = V _{CC} or GND	3.6 V		±5	μΑ
	V _I = 0.58 V	1.65 V	25		
	V _I = 1.07 V	1.65 V	-25		
	$V_1 = 0.7 \text{ V}$	2.3 V	45		
I _{I(hold)}	V _I = 1.7 V	2.3 V	-45		μΑ
	V _I = 0.8 V	3 V	75		
	V _I = 2 V	3 V	-75		
	$V_1 = 0 \text{ to } 3.6 \text{ V}^{(2)}$	3.6 V		±500	
I _{OZ} ⁽³⁾	$V_O = V_{CC}$ or GND	3.6 V		±10	μΑ
I _{cc}	$V_I = V_{CC}$ or GND, $I_O = 0$	3.6 V		10	μΑ
Δl _{CC}	One input at V _{CC} - 0.6 V, Other inputs at V _{CC} or GND	3 V to 3.6 V		750	μΑ
C _i Control inputs	V _I = V _{CC} or GND	3.3 V		4.5	pF
C _{io} A or B ports	V _O = V _{CC} or GND	3.3 V		12	pF

SWITCHING CHARACTERISTICS

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 1 ± 0.1		V _{CC} = 2 ± 0.2		V _{CC} = 2	2.7 V	V _{CC} = 3 ± 0.3		UNIT
	(INFOT)	(001701)	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
t _{pd}	A or B	B or A	1.5	6	1	3.5		3.6	1.3	3.4	ns
t _{en}	ŌĒ	A or B	3.4	8.6	2	6		6.3	1.6	5.5	ns
t _{dis}	ŌĒ	A or B	2.7	8	1	4.8		5.3	1.7	5.5	ns

OPERATING CHARACTERISTICS

 $T_A = 25^{\circ}C$

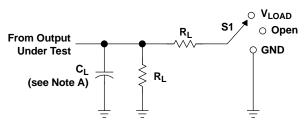
PARAMETER			TEST CONDITIONS	V _{CC} = 1.8 V TYP	V _{CC} = 2.5 V TYP	V _{CC} = 3.3 V TYP	UNIT	
	Power dissipation capacitance	Outputs enabled	C 0 f 10 MHz	25	28	31	~F	
Cpd	per transceiver	Outputs disabled C _L = 0, f = 10 MHz		0	0	0	- pF	

⁽¹⁾ All typical values are at $V_{CC} = 3.3 \text{ V}$, $T_A = 25^{\circ}\text{C}$. (2) This is the bus-hold maximum dynamic current. It is the minimum overdrive current required to switch the input from one state to

For I/O ports, the parameter I_{OZ} includes the input leakage current.



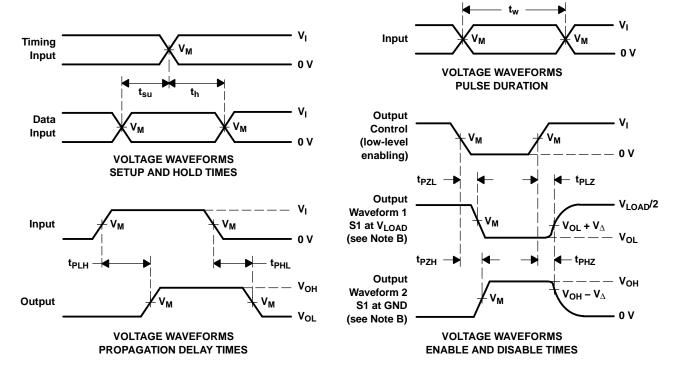
PARAMETER MEASUREMENT INFORMATION



TEST	S 1
t _{pd}	Open
t _{PLZ} /t _{PZL}	V _{LOAD}
t _{PHZ} /t _{PZH}	GND

LOAD CIRCUIT

v	IN	PUT	V	v		6	v	
V _{CC}	VI	t _r /t _f	V _M	V _{LOAD}	CL	R _L	V_{Δ}	
1.8 V ± 0.15 V	V _{CC}	≤ 2 ns	V _{CC} /2	2×V _{CC}	30 pF	1 k Ω	0.15 V	
2.5 V \pm 0.2 V	V _{CC}	≤2 ns	V _{CC} /2	2×V _{CC}	30 pF	500 Ω	0.15 V	
2.7 V	2.7 V	≤2.5 ns	1.5 V	6 V	50 pF	500 Ω	0.3 V	
3.3 V \pm 0.3 V	2.7 V	≤2.5 ns	1.5 V	6 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 MHz, Z_{Ω} = 50 Ω .
- 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





7-Aug-2014

PACKAGING INFORMATION

Orderable Device	Status	Package Type	Package	Pins	Package	Eco Plan	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Device Marking	Samples
	(1)		Drawing		Qty	(2)	(6)	(3)		(4/5)	
SN74ALVCH245DGVR	ACTIVE	TVSOP	DGV	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	VB245	Samples
SN74ALVCH245DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	ALVCH245	Samples
SN74ALVCH245DWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	ALVCH245	Samples
SN74ALVCH245NSR	OBSOLETE	SO	NS	20		TBD	Call TI	Call TI	-40 to 85		
SN74ALVCH245NSRE4	OBSOLETE	SO	NS	20		TBD	Call TI	Call TI	-40 to 85		
SN74ALVCH245NSRG4	OBSOLETE	SO	NS	20		TBD	Call TI	Call TI	-40 to 85		
SN74ALVCH245PW	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	VB245	Samples
SN74ALVCH245PWR	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	VB245	Samples
SN74ALVCH245PWRG4	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	VB245	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.

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



PACKAGE OPTION ADDENDUM

7-Aug-2014

(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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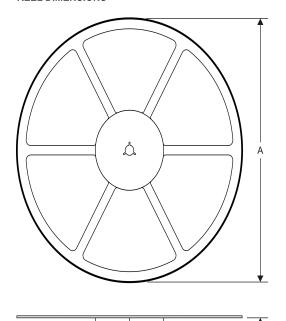
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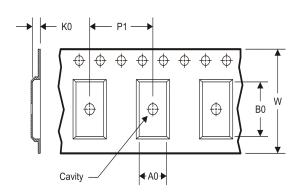
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TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
В0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

TAPE AND REEL INFORMATION

*All dimensions are nominal

Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74ALVCH245DGVR	TVSOP	DGV	20	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74ALVCH245DWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.0	2.7	12.0	24.0	Q1
SN74ALVCH245PWR	TSSOP	PW	20	2000	330.0	16.4	6.95	7.1	1.6	8.0	16.0	Q1

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*All dimensions are nominal

1	A Marian dia na manana							
	Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
	SN74ALVCH245DGVR	TVSOP	DGV	20	2000	367.0	367.0	35.0
	SN74ALVCH245DWR	SOIC	DW	20	2000	367.0	367.0	45.0
	SN74ALVCH245PWR	TSSOP	PW	20	2000	367.0	367.0	38.0

DGV (R-PDSO-G**)

24 PINS SHOWN

PLASTIC SMALL-OUTLINE



NOTES: A. All linear dimensions are in millimeters.

B. This drawing is subject to change without notice.

C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15 per side.

D. Falls within JEDEC: 24/48 Pins – MO-153 14/16/20/56 Pins – MO-194



SOIC



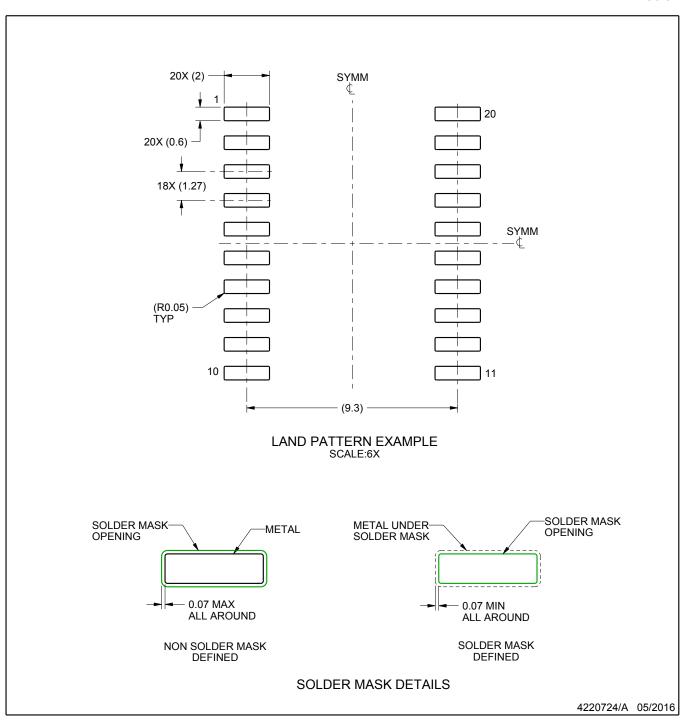
- 1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.

 2. This drawing is subject to change without notice.

 3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not
- exceed 0.15 mm per side.
- 4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.43 mm per side.
- 5. Reference JEDEC registration MS-013.



SOIC



NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.



SOIC



NOTES: (continued)

- 8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
- 9. Board assembly site may have different recommendations for stencil design.



PW (R-PDSO-G20)

PLASTIC SMALL OUTLINE



- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M—1994.
- B. This drawing is subject to change without notice.
- Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
- Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
- E. Falls within JEDEC MO-153



PW (R-PDSO-G20)

PLASTIC SMALL OUTLINE



- All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
 C. Publication IPC-7351 is recommended for alternate design.
- D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
- E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



MECHANICAL DATA

NS (R-PDSO-G**)

14-PINS SHOWN

PLASTIC SMALL-OUTLINE PACKAGE



- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.



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