

SN54AHC126, SN74AHC126 QUADRUPLE BUS BUFFER GATES WITH 3-STATE OUTPUTS

SCLS257B – DECEMBER 1995 – REVISED JUNE 1996

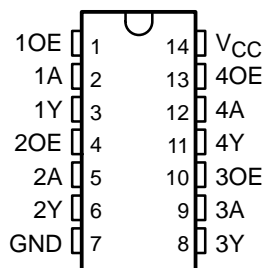
- Operating Range 2-V to 5.5-V V_{CC}
- **EPIC™** (Enhanced-Performance Implanted CMOS) Process
- High Latch-Up Immunity Exceeds 250 mA Per JEDEC Standard JESD-17
- Package Options Include Plastic Small-Outline (D), Shrink Small-Outline (DB), Thin Shrink Small-Outline (PW), and Ceramic Flat (W) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) 300-mil DIPs

description

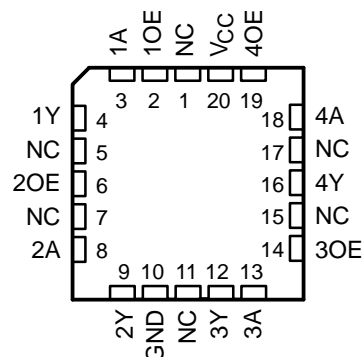
The 'AHC126 are quadruple bus buffer gates featuring independent line drivers with 3-state outputs. Each output is disabled when the associated output-enable (OE) input is low. When OE is high, the respective gate passes the data from the A input to its Y output.

The SN54AHC126 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74AHC126 is characterized for operation from -40°C to 85°C .

SN54AHC126 . . . J OR W PACKAGE
SN74AHC126 . . . D, DB, N, OR PW PACKAGE
(TOP VIEW)



SN54AHC126 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

FUNCTION TABLE
(each buffer)

INPUTS		OUTPUT Y
OE	A	
H	H	H
H	L	L
L	X	Z



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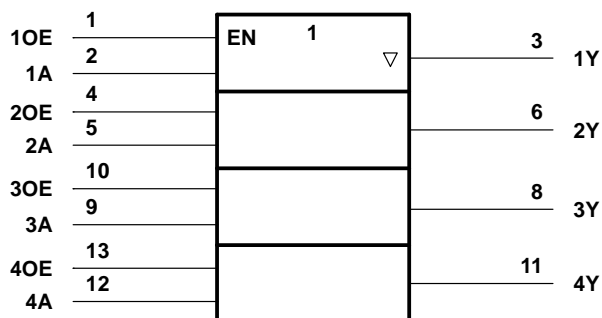
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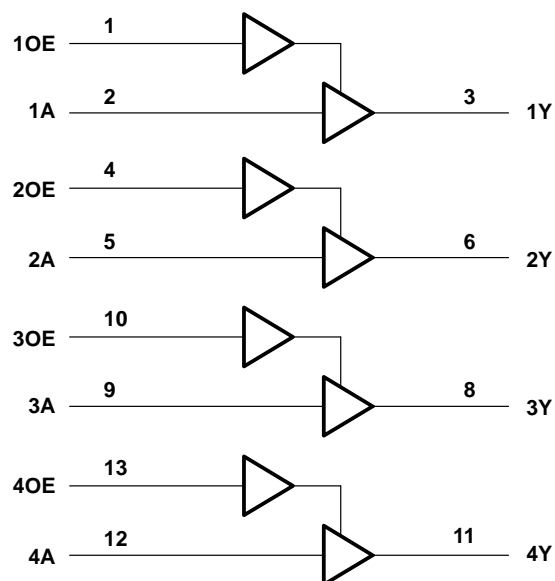
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logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for the D, DB, J, N, PW, and W packages.

logic diagram (positive logic)



Pin numbers shown are for the D, DB, J, N, PW, and W packages.

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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 7 V
Output voltage range, V_O (see Note 1)	–0.5 V to $V_{CC} + 0.5$ V
Input clamp current, I_{IK} ($V_I < 0$)	–20 mA
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	±50 mA
Maximum power dissipation at $T_A = 55^\circ\text{C}$ (in still air) (see Note 2): D package	1.25 W
DB or PW package	0.5 W
N package	1.1 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 maximum package power dissipation is calculated using a junction temperature of 150°C and a board trace length of 750 mils, except for the N package, which has a trace length of zero.

recommended operating conditions (see Note 3)

			SN54AHC126		SN74AHC126		UNIT
			MIN	MAX	MIN	MAX	
V _{CC}	Supply voltage		2	5.5	2	5.5	V
V _{IH}	High-level input voltage	V _{CC} = 2 V	1.5		1.5		V
		V _{CC} = 3 V	2.1		2.1		
		V _{CC} = 5.5 V	3.85		3.85		
V _{IL}	Low-level input voltage	V _{CC} = 2 V	0.5		0.5		V
		V _{CC} = 3 V	0.9		0.9		
		V _{CC} = 5.5 V	1.65		1.65		
V _I	Input voltage		0	5.5	0	5.5	V
V _O	Output voltage		0	V _{CC}	0	V _{CC}	V
I _{OH}	High-level output current	V _{CC} = 2 V	−50		−50		μA
		V _{CC} = 3.3 V ± 0.3 V	−4		−4		mA
		V _{CC} = 5 V ± 0.5 V	−8		−8		
I _{OL}	Low-level output current	V _{CC} = 2 V	50		50		μA
		V _{CC} = 3.3 V ± 0.3 V	4		4		mA
		V _{CC} = 5 V ± 0.5 V	8		8		
Δt/Δv	Input transition rise or fall rate	V _{CC} = 3.3 V ± 0.3 V	100		100		ns/V
		V _{CC} = 5 V ± 0.5 V	20		20		
T _A	Operating free-air temperature		−55	125	−40	85	°C

NOTE 3: Unused inputs must be held high or low to prevent them from floating.



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

PARAMETER	TEST CONDITIONS	V _{CC}	T _A = 25°C			SN54AHC126		SN74AHC126		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V _{OH}	I _{OH} = – 50 µA	2 V	1.9	2		1.9		1.9		V
		3 V	2.9	3		2.9		2.9		
		4.5 V	4.4	4.5		4.4		4.4		
	I _{OH} = – 4 mA	3 V	2.58			2.48		2.48		
	I _{OH} = – 8 mA	4.5 V	3.94			3.8		3.8		
V _{OL}	I _{OL} = 50 µA	2 V			0.1		0.1		0.1	V
		3 V			0.1		0.1		0.1	
		4.5 V			0.1		0.1		0.1	
	I _{OL} = 4 mA	3 V			0.36		0.5		0.44	
	I _{OL} = 8 mA	4.5 V			0.36		0.5		0.44	
I _I	A or OE inputs	V _I = V _{CC} or GND	5.5 V		± 0.1		± 1		± 1	µA
I _{OZ}		V _I = V _{CC} or GND	5.5 V		± 0.25		± 2.5		± 2.5	µA
I _{CC}		V _I = V _{CC} or GND, I _O = 0	5.5 V		4		40		40	µA
C _i		V _I = V _{CC} or GND	5 V		4 10				10	pF

switching characteristics over recommended operating free-air temperature range, V_{CC} = 3.3 V ± 0.3 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	SN54AHC126				UNIT	
				T _A = 25°C			MIN		MAX
				MIN	TYP	MAX			
t _{PLH} *	A	Y	C _L = 15 pF	5.6	8	1	9.5	ns	
t _{PHL} *				5.6	8	1	9.5		
t _{PZH} *	OE	Y	C _L = 15 pF	5.4	8	1	9.5	ns	
t _{PZL} *				5.4	8	1	9.5		
t _{PHZ} *	OE	Y	C _L = 15 pF	7	9.7	1	11.5	ns	
t _{PLZ} *				7	9.7	1	11.5		
t _{PLH}	A	Y	C _L = 50 pF	8.1	11.5	1	13	ns	
t _{PHL}				8.1	11.5	1	13		
t _{PZH}	OE	Y	C _L = 50 pF	7.9	11.5	1	13	ns	
t _{PZL}				7.9	11.5	1	13		
t _{PHZ}	OE	Y	C _L = 50 pF	9.5	13.2	1	15	ns	
t _{PLZ}				9.5	13.2	1	15		

* On products compliant to MIL-PRF-38535, this parameter is ensured but not production tested.



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switching characteristics over recommended operating free-air temperature range,
 $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$ (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	SN74AHC126				UNIT	
				T _A = 25°C			MIN		MAX
				MIN	TYP	MAX			
t _{PLH}	A	Y	C _L = 15 pF	5.6	8	1	9.5	ns	
t _{PHL}				5.6	8	1	9.5		
t _{PZH}	OE	Y	C _L = 15 pF	5.4	8	1	9.5	ns	
t _{PZL}				5.4	8	1	9.5		
t _{PHZ}	OE	Y	C _L = 15 pF	7	9.7	1	11.5	ns	
t _{PLZ}				7	9.7	1	11.5		
t _{PLH}	A	Y	C _L = 50 pF	8.1	11.5	1	13	ns	
t _{PHL}				8.1	11.5	1	13		
t _{PZH}	OE	Y	C _L = 50 pF	7.9	11.5	1	13	ns	
t _{PZL}				7.9	11.5	1	13		
t _{PHZ}	OE	Y	C _L = 50 pF	9.5	13.2	1	15	ns	
t _{PLZ}				9.5	13.2	1	15		

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	SN54AHC126				UNIT	
				T _A = 25°C			MIN		MAX
				MIN	TYP	MAX			
t _{PLH} *	A	Y	C _L = 15 pF	3.8	5.5	1	6.5	ns	
t _{PHL} *				3.8	5.5	1	6.5		
t _{PZH} *	OE	Y	C _L = 15 pF	3.6	5.1	1	6	ns	
t _{PZL} *				3.6	5.1	1	6		
t _{PHZ} *	OE	Y	C _L = 15 pF	4.6	6.8	1	8	ns	
t _{PLZ} *				4.6	6.8	1	8		
t _{PLH}	A	Y	C _L = 50 pF	5.3	7.5	1	8.5	ns	
t _{PHL}				5.3	7.5	1	8.5		
t _{PZH}	OE	Y	C _L = 50 pF	5.1	7.1	1	8	ns	
t _{PZL}				5.1	7.1	1	8		
t _{PHZ}	OE	Y	C _L = 50 pF	6.1	8.8	1	10	ns	
t _{PLZ}				6.1	8.8	1	10		

* On products compliant to MIL-PRF-38535, this parameter is ensured but not production tested.

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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	SN74AHC126				UNIT
				$T_A = 25^\circ\text{C}$			MIN	MAX
				MIN	TYP	MAX		
t_{PLH}	A	Y	$C_L = 15\text{ pF}$	3.8	5.5	1	6.5	ns
t_{PHL}				3.8	5.5	1	6.5	
t_{PZH}	OE	Y	$C_L = 15\text{ pF}$	3.6	5.1	1	6	ns
t_{PZL}				3.6	5.1	1	6	
t_{PHZ}	OE	Y	$C_L = 15\text{ pF}$	4.6	6.8	1	8	ns
t_{PLZ}				4.6	6.8	1	8	
t_{PLH}	A	Y	$C_L = 50\text{ pF}$	5.3	7.5	1	8.5	ns
t_{PHL}				5.3	7.5	1	8.5	
t_{PZH}	OE	Y	$C_L = 50\text{ pF}$	5.1	7.1	1	8	ns
t_{PZL}				5.1	7.1	1	8	
t_{PHZ}	OE	Y	$C_L = 50\text{ pF}$	6.1	8.8	1	10	ns
t_{PLZ}				6.1	8.8	1	10	

output-skew characteristics, $C_L = 50\text{ pF}$ (see Note 4)

PARAMETER	V _{CC}	SN74AHC126				UNIT
		T _A = 25°C		MIN	MAX	
		MIN	MAX			
t _{sk(o)} Output skew	3.3 V ± 0.3 V	1.5		1.5		ns
	5 V ± 0.5 V	1		1		

NOTE 4: Characteristics are determined during product characterization and ensured by design.

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

PARAMETER		SN74AHC126			UNIT
		MIN	TYP	MAX	
$V_{OL(P)}$ Quiet output, maximum dynamic V_{OL}		0.8			V
$V_{OL(V)}$ Quiet output, minimum dynamic V_{OL}		-0.8			V
$V_{OH(V)}$ Quiet output, minimum dynamic V_{OH}		4.4			V
$V_{IH(D)}$ High-level dynamic input voltage		3.5			V
$V_{IL(D)}$ Low-level dynamic input voltage		1.5			V

NOTE 5: Characteristics are determined during product characterization and ensured by design for surface-mount packages only.

operating characteristics, $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$

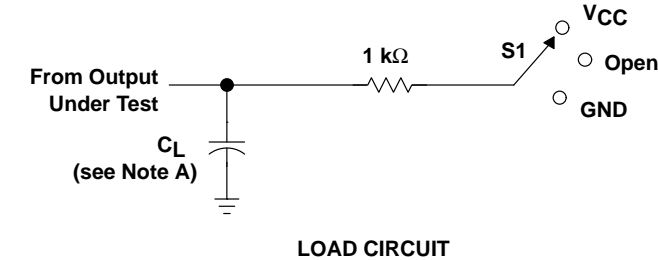
PARAMETER	TEST CONDITIONS	TYP	UNIT
C_{pd} Power dissipation capacitance	No load, $f = 1\text{ MHz}$	14	pF



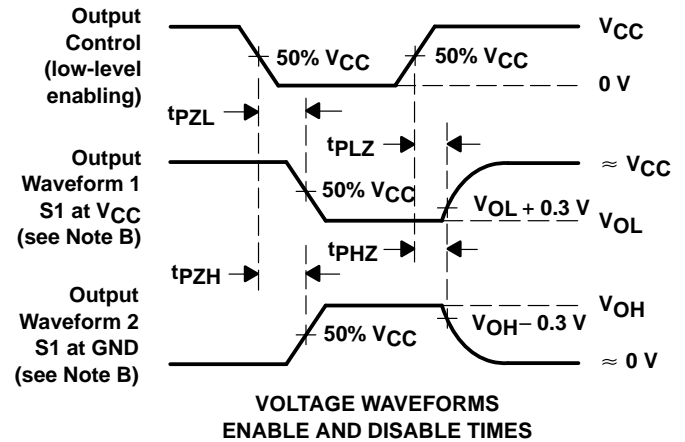
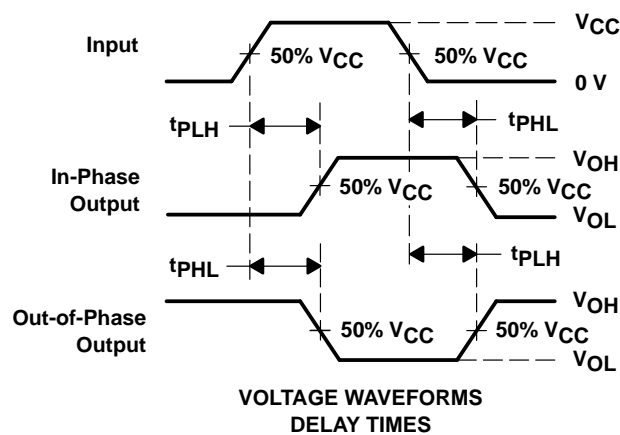
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PARAMETER MEASUREMENT INFORMATION



TEST	S1
tPLH/tPHL	Open
tPLZ/tPZL	VCC
tPHZ/tPZH	GND



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: $PRR \leq 1$ MHz, $Z_O = 50 \Omega$, $t_r = 3$ ns, $t_f = 3$ ns.

D. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

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