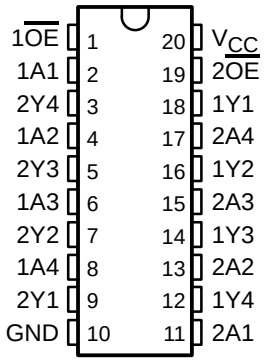
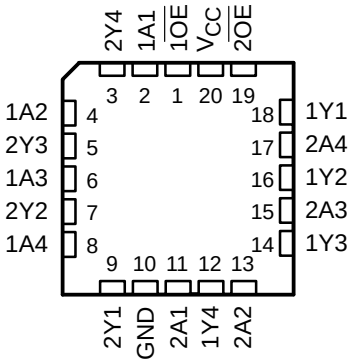
- **Operating Range 2-V to 5.5-V V_{CC}**
- ***EPIC***™ **(Enhanced-Performance Implanted CMOS) Process**
- **High Latch-Up Immunity Exceeds 250 mA Per JESD 17**
- **Package Options Include Plastic Small-Outline (DW), Shrink Small-Outline (DB), Thin Very Small-Outline (DGV), Thin Shrink Small-Outline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

SN54AHC244 . . . J OR W PACKAGE
SN74AHC244 . . . DB, DGV, DW, N, OR PW PACKAGE
(TOP VIEW)



SN54AHC244 . . . FK PACKAGE
(TOP VIEW)



description

These octal buffers/drivers are designed specifically to improve the performance and density of 3-state memory-address drivers, clock drivers, and bus-oriented receivers and transmitters.

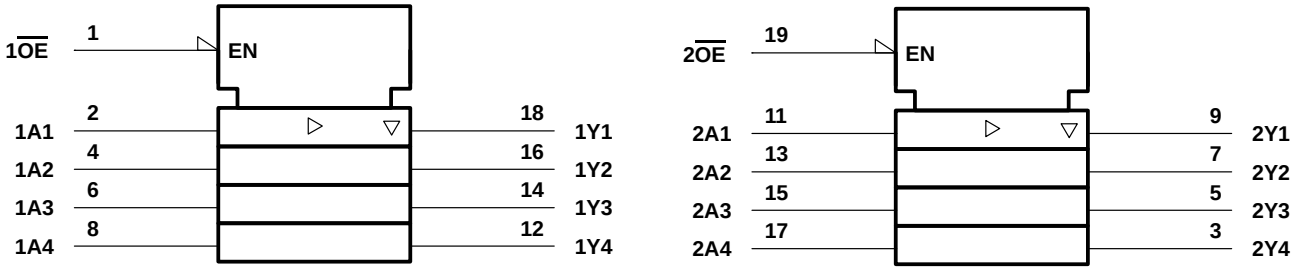
The ’AHC244 are organized as two 4-bit buffers/line drivers with separate output-enable ($\overline{OE}$) inputs. When $\overline{OE}$ is low, the device passes data from the A inputs to the Y outputs. When $\overline{OE}$ is high, the outputs are in the high-impedance state.

The SN54AHC244 is characterized for operation over the full military temperature range of –55°C to 125°C. The SN74AHC244 is characterized for operation from –40°C to 85°C.

FUNCTION TABLE
(each buffer)

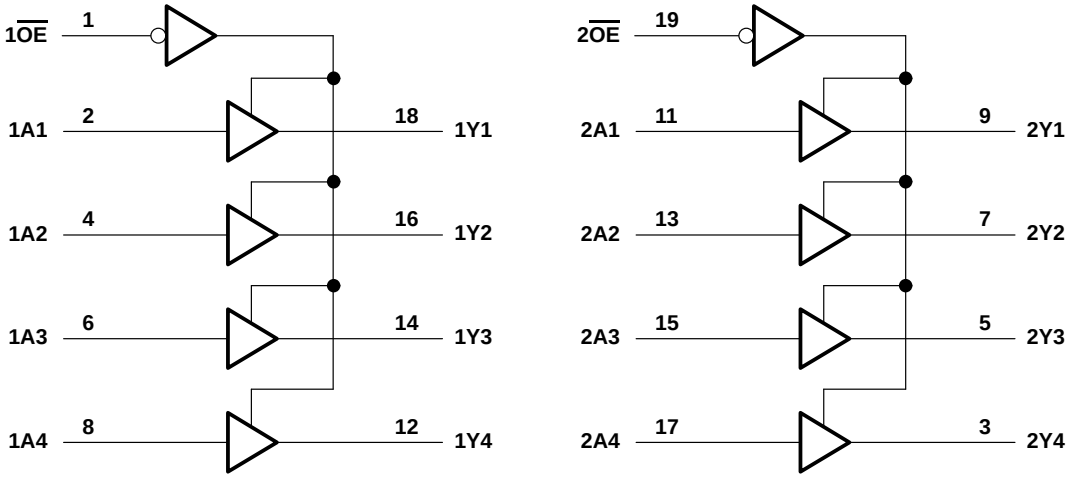
INPUTS		OUTPUT
$\overline{OE}$	A	Y
L	H	H
L	L	L
H	X	Z

logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

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 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
Package thermal impedance, θ_{JA} (see Note 2): DB package . . . . . 115°C/W
DGV package . . . . . 146°C/W
DW package . . . . . 97°C/W
N package . . . . . 67°C/W
PW package . . . . . 128°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, except for through-hole packages, which use a trace length of zero.

recommended operating conditions (see Note 3)

			SN54AHC244		SN74AHC244		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	
$\Delta t/\Delta v$	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.

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

PARAMETER		TEST CONDITIONS	V_{CC}	T_A = 25°C			SN54AHC244		SN74AHC244		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	Data inputs	$V_I = V_{CC}$ or GND	5.5 V			±0.1		±1		±1	μA
	Control inputs					±0.1		±1		±1	
I_{OZ}		$V_O = V_{CC}$ or GND, V_I ($\overline{OE}$) = V_{IL} or V_{IH}	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		2	10				10	pF
C_o		$V_O = V_{CC}$ or GND	5 V		3.5						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	SN54AHC244					UNIT
				T_A = 25°C			MIN	MAX	
				MIN	TYP	MAX			
t_{PLH}*	A	Y	C_L = 15 pF		5.8	8.4	1	10	ns
t_{PHL}*					5.8	8.4	1	10	
t_{PZH}*	$\overline{OE}$	Y	C_L = 15 pF		6.6	10.6	1	12.5	ns
t_{PZL}*					6.6	10.6	1	12.5	
t_{PHZ}*	$\overline{OE}$	Y	C_L = 15 pF		5	9.7	1	11	ns
t_{PLZ}*					5	9.7	1	11	
t_{PLH}	A	Y	C_L = 50 pF		8.3	11.9	1	13.5	ns
t_{PHL}					8.3	11.9	1	13.5	
t_{PZH}	$\overline{OE}$	Y	C_L = 50 pF		9.1	14.1	1	16	ns
t_{PZL}					9.1	14.1	1	16	
t_{PHZ}	$\overline{OE}$	Y	C_L = 50 pF		10.3	14	1	16	ns
t_{PLZ}					10.3	14	1	16	

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

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	SN74AHC244					UNIT
				T_A = 25°C			MIN	MAX	
				MIN	TYP	MAX			
t_{PLH}	A	Y	C_L = 15 pF		5.8	8.4	1	10	ns
t_{PHL}					5.8	8.4	1	10	
t_{PZH}	$\overline{OE}$	Y	C_L = 15 pF		6.6	10.6	1	12.5	ns
t_{PZL}					6.6	10.6	1	12.5	
t_{PHZ}	$\overline{OE}$	Y	C_L = 15 pF		5	9.7	1	11	ns
t_{PLZ}					5	9.7	1	11	
t_{PLH}	A	Y	C_L = 50 pF		8.3	11.9	1	13.5	ns
t_{PHL}					8.3	11.9	1	13.5	
t_{PZH}	$\overline{OE}$	Y	C_L = 50 pF		9.1	14.1	1	16	ns
t_{PZL}					9.1	14.1	1	16	
t_{PHZ}	$\overline{OE}$	Y	C_L = 50 pF		10.3	14	1	16	ns
t_{PLZ}					10.3	14	1	16	

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	SN54AHC244					UNIT
				T_A = 25°C			MIN	MAX	
				MIN	TYP	MAX			
t_{PLH}*	A	Y	C_L = 15 pF		3.9	5.5	1	6.5	ns
t_{PHL}*					3.9	5.5	1	6.5	
t_{PZH}*	$\overline{OE}$	Y	C_L = 15 pF		4.7	7.3	1	8.5	ns
t_{PZL}*					4.7	7.3	1	8.5	
t_{PHZ}*	$\overline{OE}$	Y	C_L = 15 pF		5	7.2	1	8.5	ns
t_{PLZ}*					5	7.2	1	8.5	
t_{PLH}	A	Y	C_L = 50 pF		5.4	7.5	1	8.5	ns
t_{PHL}					5.4	7.5	1	8.5	
t_{PZH}	$\overline{OE}$	Y	C_L = 50 pF		6.2	9.3	1	10.5	ns
t_{PZL}					6.2	9.3	1	10.5	
t_{PHZ}	$\overline{OE}$	Y	C_L = 50 pF		6.7	9.2	1	10.5	ns
t_{PLZ}					6.7	9.2	1	10.5	

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

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	SN74AHC244					UNIT
				T_A = 25°C			MIN	MAX	
				MIN	TYP	MAX			
t_{PLH}	A	Y	C_L = 15 pF		3.9	5.5	1	6.5	ns
t_{PHL}					3.9	5.5	1	6.5	
t_{PZH}	$\overline{OE}$	Y	C_L = 15 pF		4.7	7.3	1	8.5	ns
t_{PZL}					4.7	7.3	1	8.5	
t_{PHZ}	$\overline{OE}$	Y	C_L = 15 pF		5	7.2	1	8.5	ns
t_{PLZ}					5	7.2	1	8.5	
t_{PLH}	A	Y	C_L = 50 pF		5.4	7.5	1	8.5	ns
t_{PHL}					5.4	7.5	1	8.5	
t_{PZH}	$\overline{OE}$	Y	C_L = 50 pF		6.2	9.3	1	10.5	ns
t_{PZL}					6.2	9.3	1	10.5	
t_{PHZ}	$\overline{OE}$	Y	C_L = 50 pF		6.7	9.2	1	10.5	ns
t_{PLZ}					6.7	9.2	1	10.5	

output-skew characteristics, C_L = 50 pF (see Note 4)

PARAMETER		V_{CC}	SN74AHC244			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 V, C_L = 50 pF, T_A = 25°C (see Note 5)

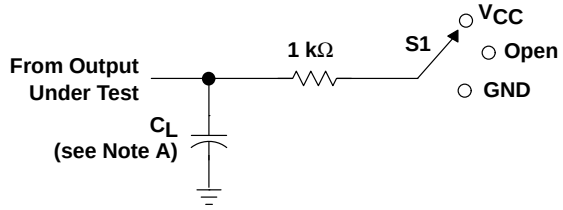
PARAMETER		SN74AHC244			UNIT
		MIN	TYP	MAX	
$V_{OL(P)}$	Quiet output, maximum dynamic V_{OL}		0.5		V
$V_{OL(V)}$	Quiet output, minimum dynamic V_{OL}		–0.2		V
$V_{OH(V)}$	Quiet output, minimum dynamic V_{OH}		4.8		V
$V_{IH(D)}$	High-level dynamic input voltage	3.5			V
$V_{IL(D)}$	Low-level dynamic input 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 V, T_A = 25°C

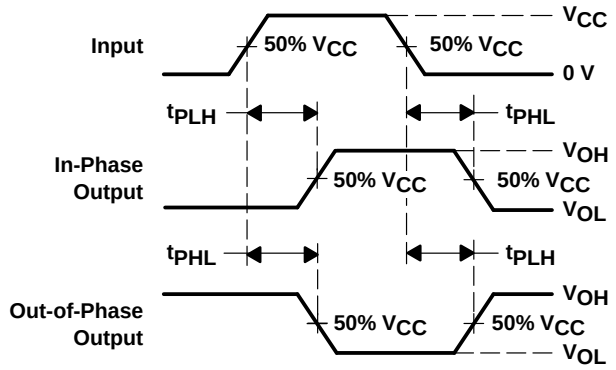
PARAMETER		TEST CONDITIONS		TYP	UNIT
C_{pd}	Power dissipation capacitance	No load,	f = 1 MHz	8.6	pF

PARAMETER MEASUREMENT INFORMATION

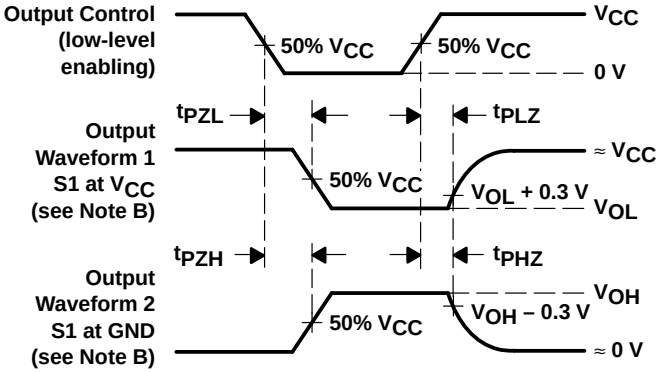


LOAD CIRCUIT

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



VOLTAGE WAVEFORMS
DELAY TIMES



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES

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 ≤ 1 MHz, Z_O = 50 Ω, 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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