

54ABT244 Octal Buffer/Line Driver with TRI-STATE® Outputs

General Description

The 'ABT244 is an octal buffer and line driver with TRI-STATE outputs designed to be employed as a memory and address driver, clock driver, or bus-oriented transmitter/receiver.

Features

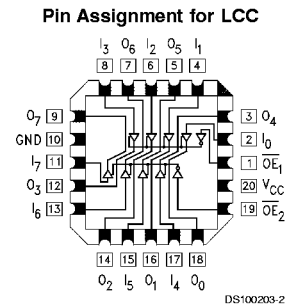
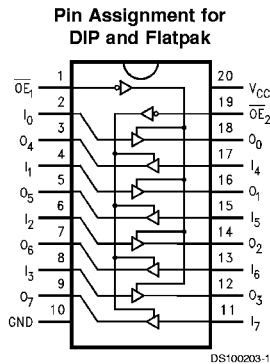
- Non-inverting buffers
- Output sink capability of 48 mA, source capability of 24 mA
- Output switching specified for both 50 pF and 250 pF loads

- Guaranteed simultaneous switching, noise level and dynamic threshold performance
- Guaranteed latchup protection
- High impedance glitch free bus loading during entire power up and power down cycle
- Nondestructive hot insertion capability
- Disable time less than enable time to avoid bus contention
- Standard Microcircuit Drawing (SMD) 5962-9214701

Ordering Code

Military	Package Number	Package Description
54ABT244J-QML	J20A	20-Lead Ceramic Dual-In-Line
54ABT244W-QML	W20A	20-Lead Cerpack
54ABT244E-QML	E20A	20-Lead Ceramic Leadless Chip Carrier, Type C

Connection Diagrams



Pin Names	Description
$\overline{OE}_1, \overline{OE}_2$	Output Enable Input (Active Low)
I_0-I_7	Inputs
O_0-O_7	Outputs

Truth Table

\overline{OE}_1	I_{0-3}	O_{0-3}	\overline{OE}_2	I_{4-7}	O_{4-7}
H	X	Z	H	X	Z
L	H	H	L	H	H
L	L	L	L	L	L

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial
Z = High Impedance

TRI-STATE® is a registered trademark of National Semiconductor Corporation.

Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Storage Temperature	-65°C to +150°C
Ambient Temperature under Bias	-55°C to +125°C
Junction Temperature under Bias	
Ceramic	-55°C to +175°C
V _{CC} Pin Potential to Ground Pin	-0.5V to +7.0V
Input Voltage (Note 2)	-0.5V to +7.0V
Input Current (Note 2)	-30 mA to +5.0 mA
Voltage Applied to Any Output in the Disabled or Power-Off State	-0.5V to 5.5V
in the HIGH State	-0.5V to V _{CC}

Current Applied to Output in LOW State (Max)	twice the rated I _{OL} (mA)
DC Latchup Source Current	-500 mA
Over Voltage Latchup (I/O)	10V

Recommended Operating Conditions

Free Air Ambient Temperature	
Military	-55°C to +125°C
Supply Voltage	
Military	+4.5V to +5.5V
Minimum Input Edge Rate	(ΔV/Δt)
Data Input	50 mV/ns
Enable Input	20 mV/ns

DC Electrical Characteristics

Symbol	Parameter	ABT244			Units	V _{CC}	Conditions
		Min	Typ	Max			
V _{IH}	Input HIGH Voltage	2.0			V		Recognized HIGH Signal
V _{IL}	Input LOW Voltage			0.8	V		Recognized LOW Signal
V _{CD}	Input Clamp Diode Voltage			-1.2	V	Min	I _{IN} = -18 mA
V _{OH}	Output HIGH Voltage	54ABT	2.5		V	Min	I _{OH} = -3 mA
		54ABT	2.0		V	Min	I _{OH} = -24 mA
V _{OL}	Output LOW Voltage	54ABT		0.55	V	Min	I _{OL} = 48 mA
I _{IH}	Input HIGH Current			5	μA	Max	V _{IN} = 2.7V (Note 4)
				5	μA	Max	V _{IN} = V _{CC}
I _{BVI}	Input HIGH Current Breakdown Test			7	μA	Max	V _{IN} = 7.0V
I _{IL}	Input LOW Current			-5	μA	Max	V _{IN} = 0.5V (Note 4)
				-5	μA	Max	V _{IN} = 0.0V
V _{ID}	Input Leakage Test	4.75			V	0.0	I _{ID} = 1.9 μA All Other Pins Grounded
I _{OZH}	Output Leakage Current			50	μA	0 - 5.5V	V _{OUT} = 2.7V; \overline{OE}_n = 2.0V
I _{OZL}	Output Leakage Current			-50	μA	0 - 5.5V	V _{OUT} = 0.5V; \overline{OE}_n = 2.0V
I _{OS}	Output Short-Circuit Current	-100		-275	mA	Max	V _{OUT} = 0.0V
I _{CEX}	Output High Leakage Current			50	μA	Max	V _{OUT} = V _{CC}
I _{ZZ}	Bus Drainage Test			100	μA	0.0	V _{OUT} = 5.5V; All Others GND
I _{CCH}	Power Supply Current			50	μA	Max	All Outputs HIGH
I _{CCL}	Power Supply Current			30	mA	Max	All Outputs LOW
I _{CCZ}	Power Supply Current			50	μA	Max	\overline{OE}_n = V _{CC} ; All Others at V _{CC} or Ground
I _{CCT}	Additional I _{CC} /Input	Outputs Enabled	2.5		mA	Max	V _I = V _{CC} - 2.1V
		Outputs TRI-STATE	2.5		mA	Max	Enable Input V _I = V _{CC} - 2.1V
		Outputs TRI-STATE	50		μA	Max	Data Input V _I = V _{CC} - 2.1V All Others at V _{CC} or Ground
I _{CCD}	Dynamic I _{CC}	No Load			mA/ MHz	Max	Outputs Open \overline{OE}_n = GND, (Note 3) One Bit Toggling, 50% Duty Cycle

Note 1: Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

Note 2: Either voltage limit or current limit is sufficient to protect inputs.

Note 3: For 8 bits toggling, I_{CCD} < 0.8 mA/MHz.

Note 4: Guaranteed, but not tested.

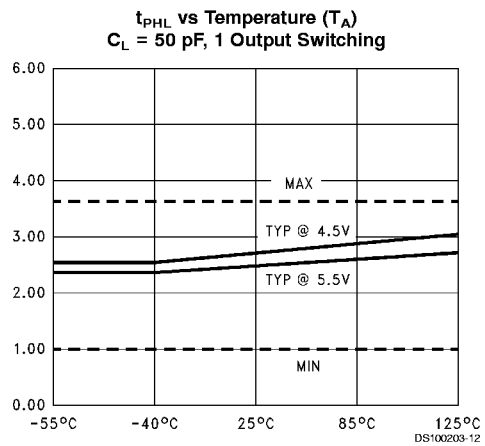
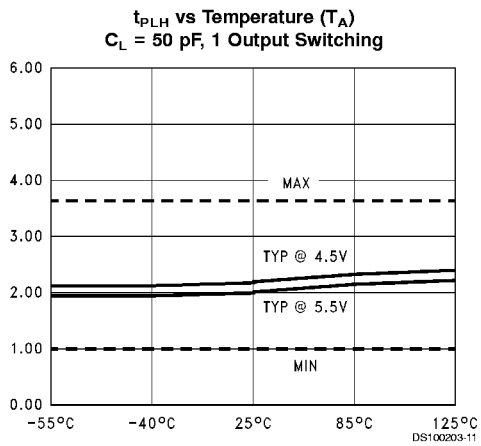
AC Electrical Characteristics

Symbol	Parameter	54ABT		Units	Fig. No.
		$T_A = -55^\circ\text{C to } +125^\circ\text{C}$			
		$V_{CC} = 4.5\text{V} - 5.5\text{V}$			
		Min	Max		
t_{PLH}	Propagation Delay	1.0	5.3	ns	Figure 5
t_{PHL}	Data to Outputs	1.0	5.0		
t_{PZH}	Output Enable	0.8	6.5	ns	Figure 4
t_{PZL}	Time	1.2	7.9		
t_{PHZ}	Output Disable	1.2	7.6	ns	Figure 4
t_{PLZ}	Time	1.0	7.9		

Capacitance

Symbol	Parameter	Typ	Units	Conditions $T_A = 25^\circ\text{C}$
C_{IN}	Input Capacitance	5.0	pF	$V_{CC} = 0\text{V}$
C_{OUT} (Note 5)	Output Capacitance	9.0	pF	$V_{CC} = 5.0\text{V}$

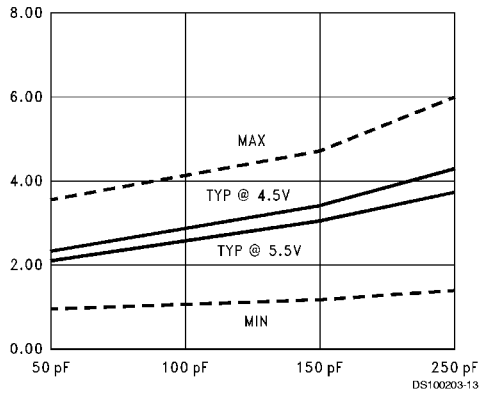
Note 5: C_{OUT} is measured at frequency $f = 1\text{ MHz}$, per MIL-STD-883B, Method 3012.



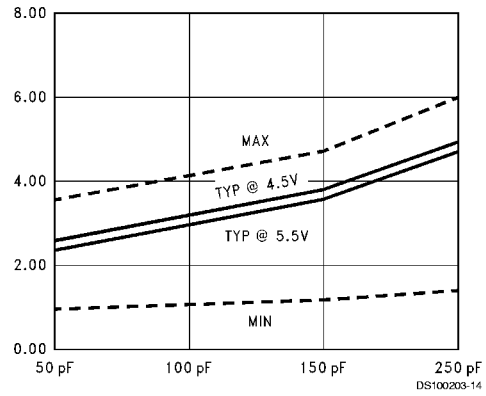
Dashed lines represent design characteristics; for specified guarantees refer to AC Characteristics Table.

Capacitance (Continued)

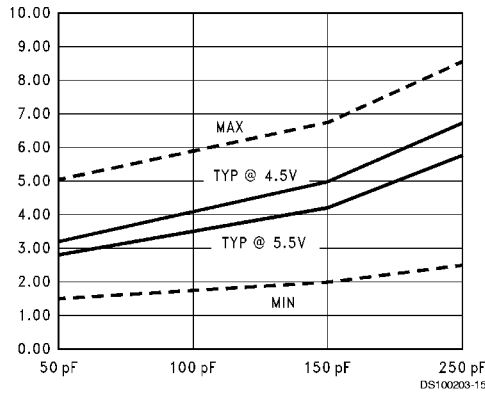
t_{PLH} vs Load Capacitance
1 Output Switching, $T_A = 25^\circ\text{C}$



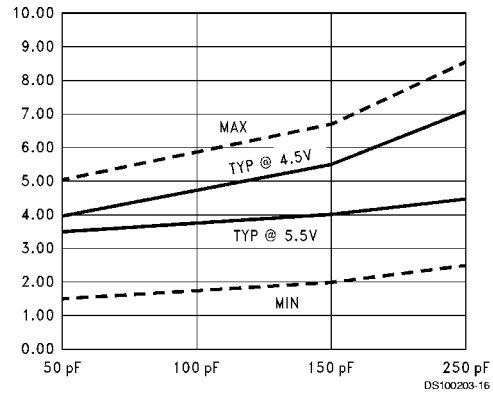
t_{PHL} vs Load Capacitance
1 Output Switching, $T_A = 25^\circ\text{C}$



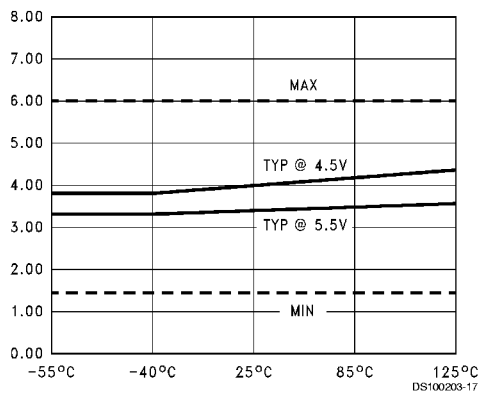
t_{PLH} vs Load Capacitance
8 Outputs Switching, $T_A = 25^\circ\text{C}$



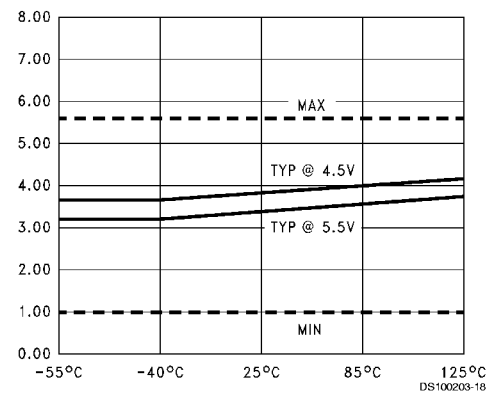
t_{PHL} vs Load Capacitance
8 Outputs Switching, $T_A = 25^\circ\text{C}$



t_{PZL} vs Temperature (T_A)
 $C_L = 50\text{ pF}$, 1 Output Switching

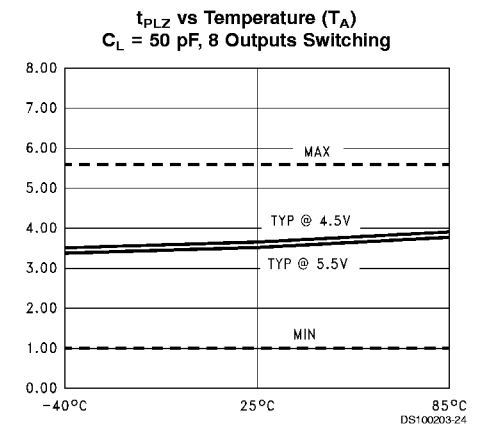
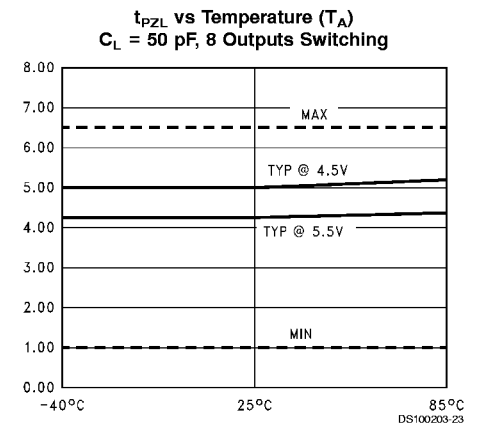
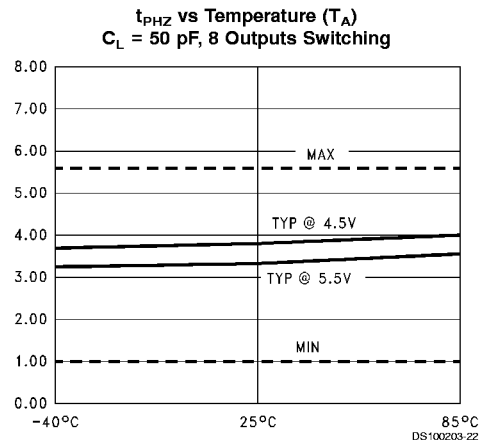
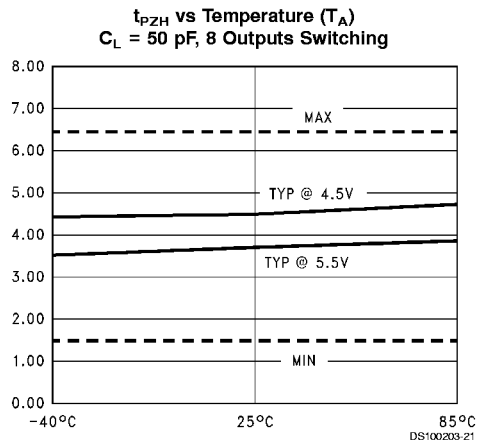
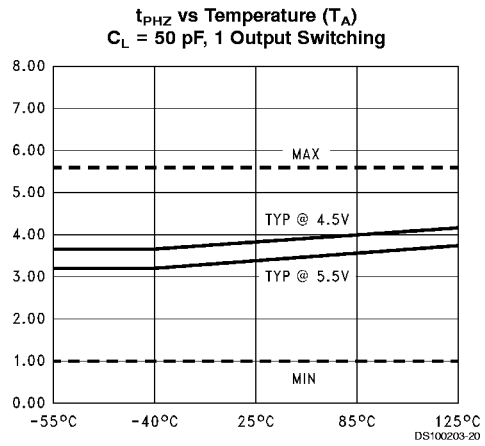
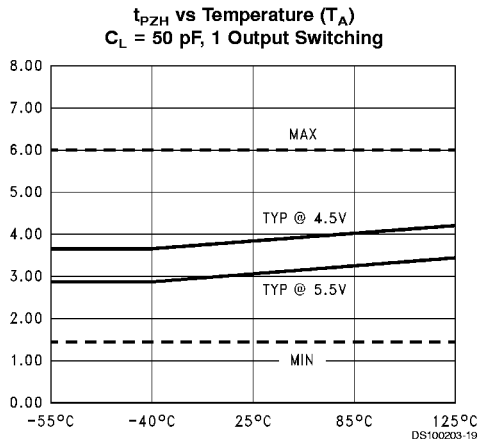


t_{PLZ} vs Temperature (T_A)
 $C_L = 50\text{ pF}$, 1 Output Switching



Dashed lines represent design characteristics; for specified guarantees refer to AC Characteristics Table.

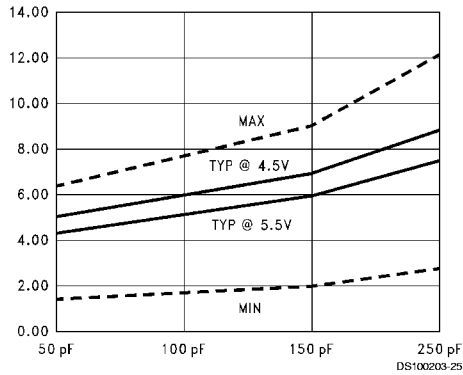
Capacitance (Continued)



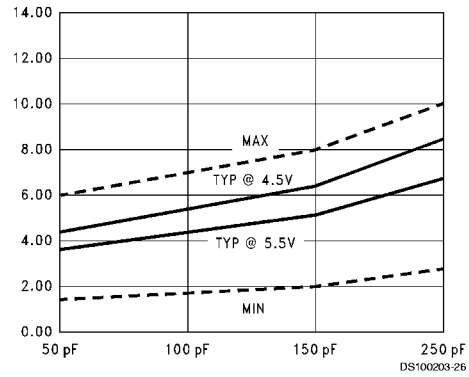
Dashed lines represent design characteristics; for specified guarantees refer to AC Characteristics Table.

Capacitance (Continued)

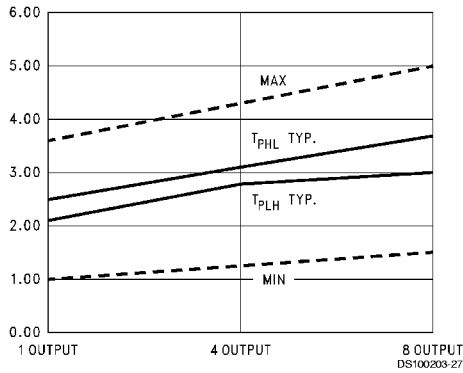
t_{PZL} vs Load Capacitance
8 Outputs Switching
 $T_A = 25^\circ\text{C}$



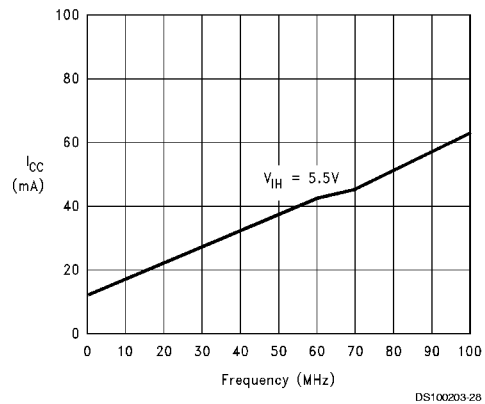
t_{PZH} vs Load Capacitance
8 Outputs Switching
 $T_A = 25^\circ\text{C}$



t_{PLH} and t_{PHL} vs Number
Outputs Switching $V_{CC} = 5.0\text{V}$,
 $T_A = 25^\circ\text{C}$, $C_L = 50\text{ pF}$

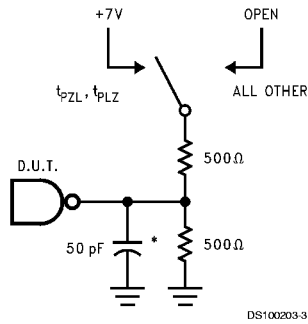


I_{CC} vs Frequency,
Average, $T_A = 25^\circ\text{C}$,
All Outputs Unloaded/Unterminated



Dashed lines represent design characteristics; for specified guarantees refer to AC Characteristics Table.

AC Loading



*Includes jig and probe capacitance

FIGURE 1. Standard AC Test Load

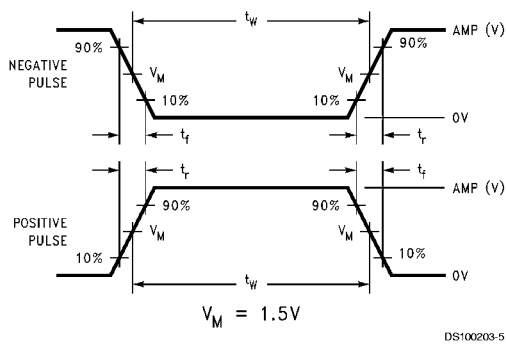


FIGURE 2. Test Input Signal Levels

Amplitude	Rep. Rate	t_w	t_r	t_f
3.0V	1 MHz	500 ns	2.5 ns	2.5 ns

FIGURE 3. Test Input Signal Requirements

AC Waveforms

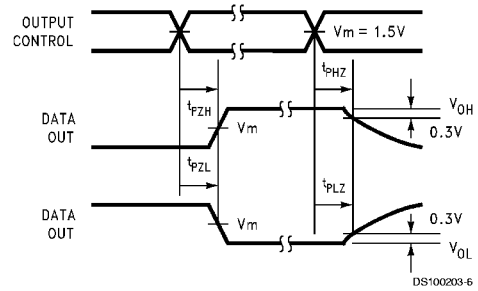


FIGURE 4. TRI-STATE Output HIGH and LOW Enable and Disable Times

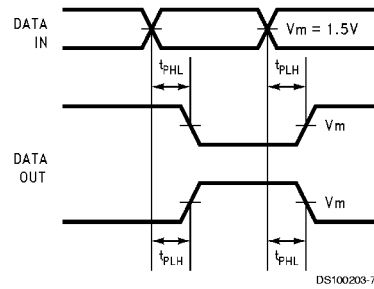
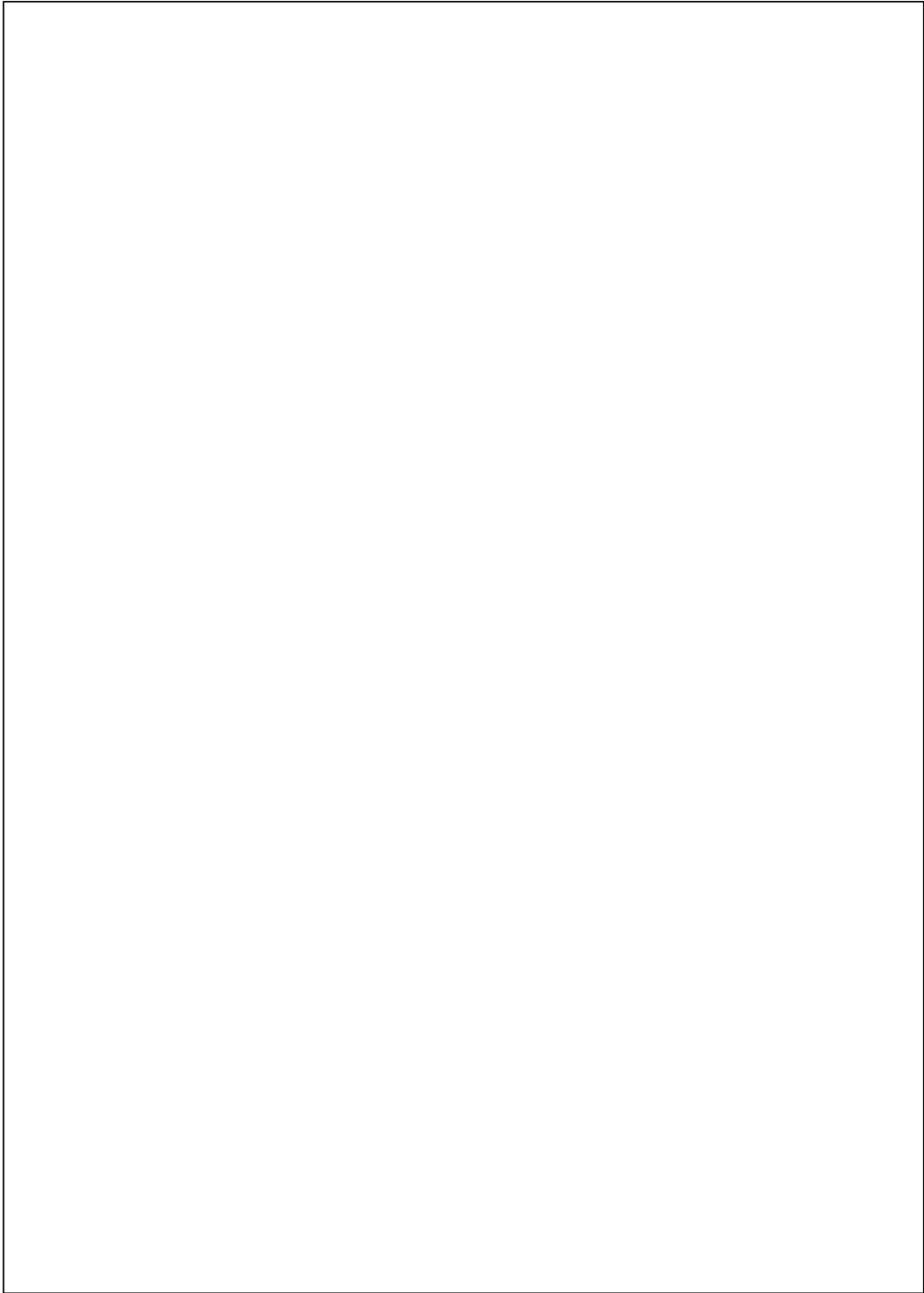
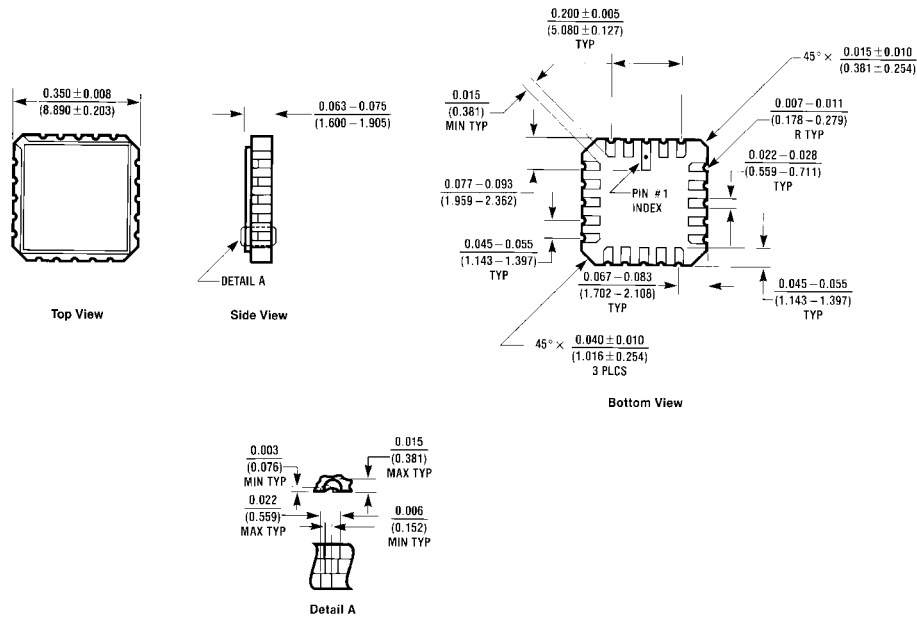


FIGURE 5. Propagation Delay Waveforms for Inverting and Non-Inverting Functions

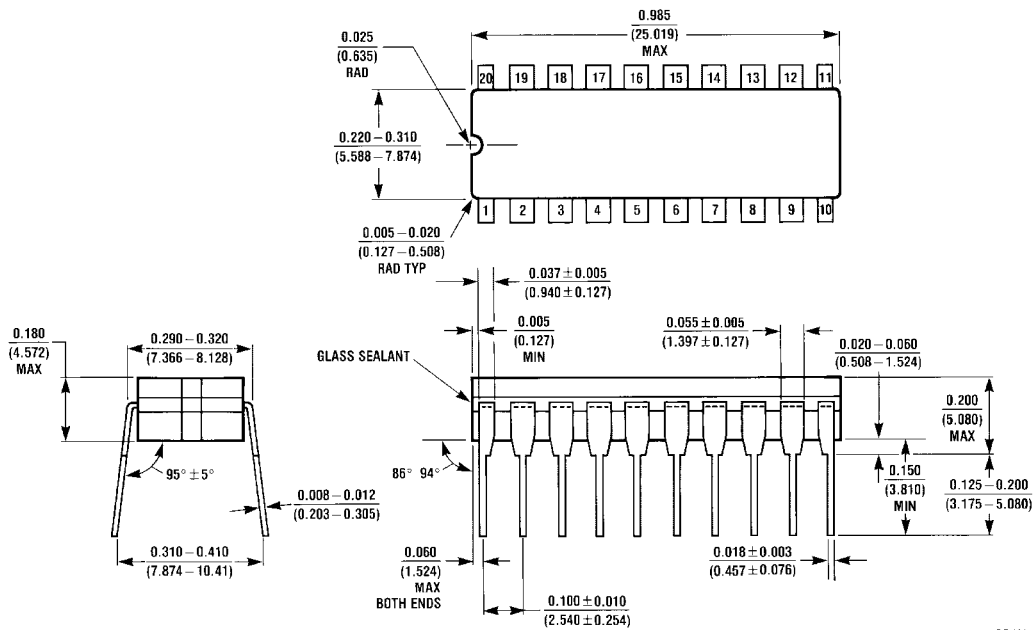


Physical Dimensions inches (millimeters) unless otherwise noted



L20A (REV D)

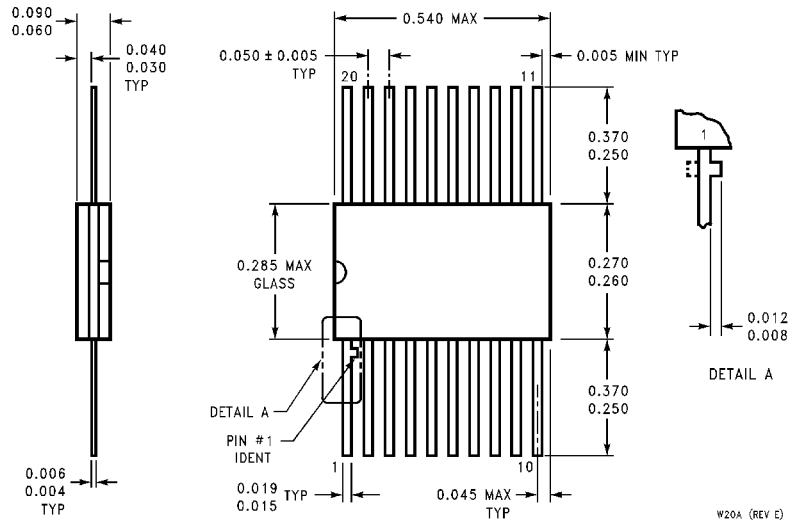
20-Terminal Ceramic Chip Carrier (L)
NS Package Number E20A



J20A (REV M)

20-Lead Ceramic Dual-In-Line (D)
NS Package Number J20A

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



LIFE SUPPORT POLICY

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.



National Semiconductor Corporation
Americas
Tel: 1-800-272-9959
Fax: 1-800-737-7018
Email: support@nsc.com

National Semiconductor Europe
Fax: +49 (0) 1 80-530 85 86
Email: europe.support@nsc.com
Deutsch Tel: +49 (0) 1 80-530 85 85
English Tel: +49 (0) 1 80-532 78 32
Français Tel: +49 (0) 1 80-532 93 58
Italiano Tel: +49 (0) 1 80-534 16 80

National Semiconductor Asia Pacific Customer Response Group
Tel: 65-2544466
Fax: 65-2504466
Email: sea.support@nsc.com

National Semiconductor Japan Ltd.
Tel: 81-3-5620-6175
Fax: 81-3-5620-6179

www.national.com