

July 1998

54ABT16244

16-Bit Buffer/Line Driver with TRI-STATE® Outputs

General Description

The 'ABT16244 contains sixteen non-inverting buffers with TRI-STATE outputs designed to be employed as a memory and address driver, clock driver, or bus oriented transmitter/receiver. The device is nibble controlled. Individual TRI-STATE control inputs can be shorted together for 8-bit or 16-bit operation.

Features

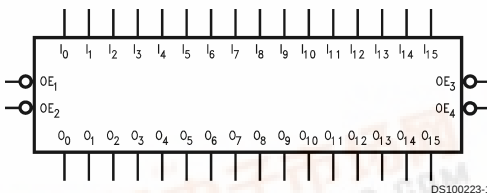
- Separate control logic for each nibble
- 16-bit version of the 'ABT244
- Outputs sink capability of 48 mA, source capability of 24 mA

- Guaranteed output skew
- Guaranteed multiple output switching specifications
- 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
- Non-destructive hot insertion capability
- Standard Microcircuit Drawing (SMD) 5962-9317402

Ordering Code:

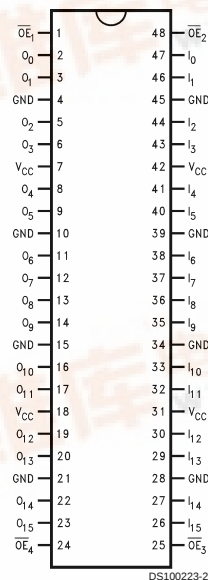
Military	Package Number	Package Description
54ABT16244W-QML	WA48A	48-Lead Cerpack

Logic Symbol



Connection Diagram

Pin Assignment for Cerpack



Pin Description

Pin Names	Description
$\overline{OE}_n$	Output Enable Inputs (Active Low)
I_0-I_{15}	Inputs
O_0-O_{15}	Outputs

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54ABT16244 16-Bit Buffer/Line Driver with TRI-STATE Outputs



Functional Description

The 'ABT16244 contains sixteen non-inverting buffers with TRI-STATE outputs. The device is nibble (4 bits) controlled with each nibble functioning identically, but independent of the other. The control pins can be shorted together to obtain full 16-bit operation.

Truth Tables

Inputs		Outputs
$\overline{OE_1}$	I_0-I_3	O_0-O_3
L	L	L
L	H	H
H	X	Z

Inputs		Outputs
$\overline{OE_3}$	I_8-I_{11}	O_8-O_{11}
L	L	L
L	H	H
H	X	Z

Inputs		Outputs
$\overline{OE_2}$	I_4-I_7	O_4-O_7
L	L	L
L	H	H
H	X	Z

Inputs		Outputs
$\overline{OE_4}$	$I_{12}-I_{15}$	$O_{12}-O_{15}$
L	L	L
L	H	H
H	X	Z

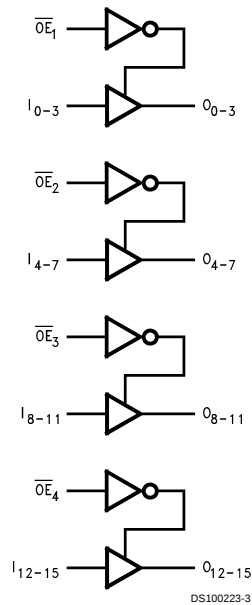
H = High Voltage Level

L = Low Voltage Level

X = Immaterial

Z = High Impedance

Logic Diagram



Absolute Maximum Ratings (Note 1)

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

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.

DC Electrical Characteristics

Symbol	Parameter	ABT16244			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 3)
				5			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 3)
				–5			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 Other Pins GND
I _{CCH}	Power Supply Current			2.0	mA	Max	All Outputs HIGH
I _{CCL}	Power Supply Current			60	mA	Max	All Outputs LOW
I _{CCZ}	Power Supply Current			2.0	mA	Max	$\overline{OE}_n$ = V _{CC} All Others at V _{CC} or GND
I _{CC} T	Additional I _{CC} /Input	Outputs Enabled	2.5	mA			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			Data Input V _I = V _{CC} – 2.1V All Others at V _{CC} or GND
I _{CCD}	Dynamic I _{CC} (Note 3)	No Load		0.1	mA/ MHz	Max	Outputs Open, $\overline{OE}_n$ = GND One Bit Toggling, 50% Duty Cycle

Note 3: Guaranteed but not tested.

DC Electrical Characteristics

Symbol	Parameter	Min	Max	Units	V _{CC}	Conditions C _L = 50 pF, R _L = 500Ω
V _{OLP}	Quiet Output Maximum Dynamic V _{OL}		1.1	V	5.0	T _A = 25°C (Note 4)
V _{OLV}	Quiet Output Minimum Dynamic V _{OL}		-0.45	V	5.0	T _A = 25°C (Note 4)

Note 4: Max number of outputs defined as (n). n – 1 data inputs are driven 0V to 3V. One output at LOW.

AC Electrical Characteristics

Symbol	Parameter	54ABT		Units
		T _A = -55°C to +125°C V _{CC} = 4.5V-5.5V C _L = 50 pF		
		Min	Max	
t _{PLH}	Propagation	0.5	5.3	ns
t _{PHL}	Delay Data to Outputs	0.5	5.9	
t _{PZH}	Output Enable	1.5	6.8	ns
t _{PZL}	Time	1.5	7.0	
t _{PHZ}	Output Disable	1.5	7.7	ns
t _{PLZ}	Time	1.5	6.5	

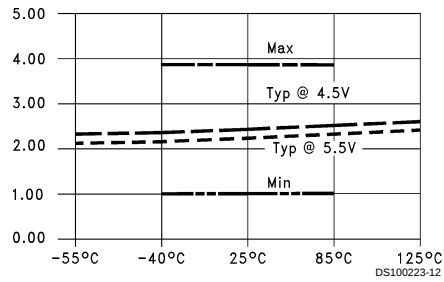
Capacitance

Symbol	Parameter	Typ	Units	Conditions T _A = 25°C
C _{IN}	Input Capacitance	5.0	pF	V _{CC} = 5.0V
C _{OUT} (Note 5)	Output Capacitance	9.0	pF	V _{CC} = 5.0V

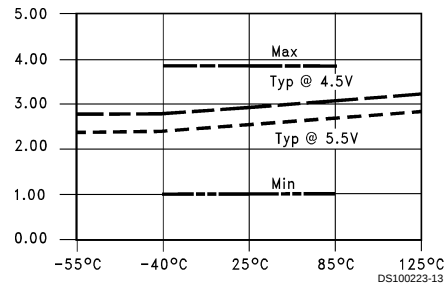
Note 5: C_{OUT} is measured at frequency f = 1 MHz; per MIL STD-883B, Method 3012.

Capacitance (Continued)

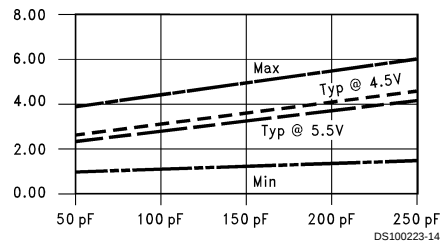
t_{PLH} vs Temperature (T_A)
 $C_L = 50$ pF, 1 Output Switching



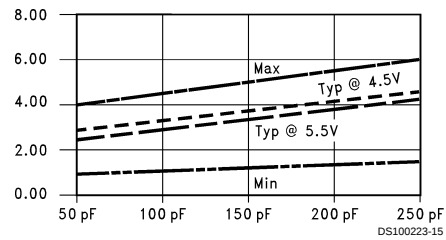
t_{PHL} vs Temperature (T_A)
 $C_L = 50$ pF, 1 Output Switching



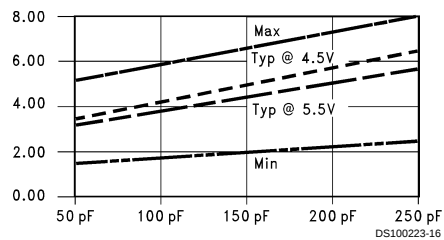
t_{PLH} vs Load Capacitance
 1 Output Switching, $T_A = 25^\circ\text{C}$



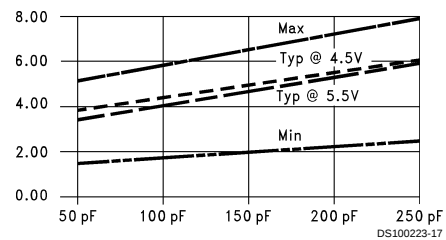
t_{PHL} vs Load Capacitance
 1 Output Switching, $T_A = 25^\circ\text{C}$



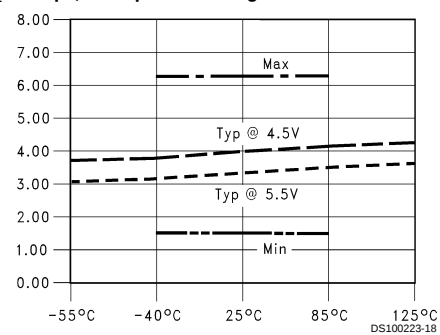
t_{PLH} vs Load Capacitance
 16 Outputs Switching, $T_A = 25^\circ\text{C}$



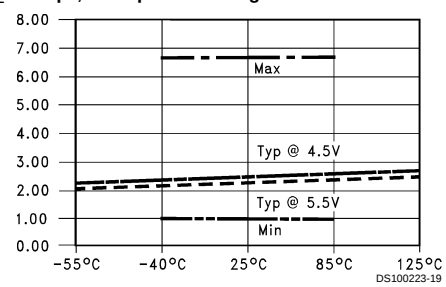
t_{PHL} vs Load Capacitance
 16 Outputs Switching, $T_A = 25^\circ\text{C}$



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



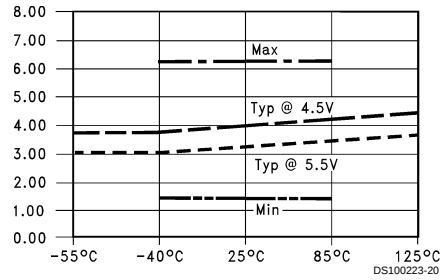
t_{PZL} vs Temperature (T_A)
 $C_L = 50$ pF, 1 Output Switching



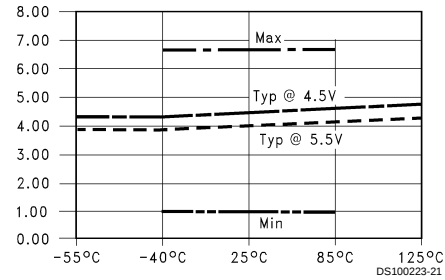
Dashed lines represent design characteristics; for specified guarantees, refer to AC Characteristics Tables.

Capacitance (Continued)

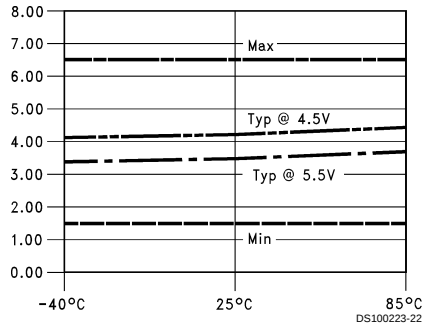
t_{PZH} vs Temperature (T_A)
 $C_L = 50$ pF, 1 Output Switching



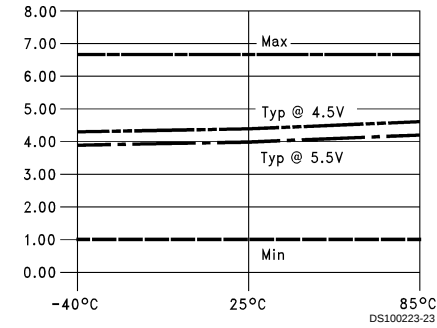
t_{PHZ} vs Temperature (T_A)
 $C_L = 50$ pF, 1 Output Switching



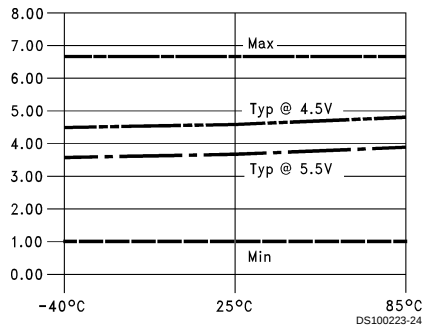
t_{PZH} vs Temperature (T_A)
 $C_L = 50$ pF, 16 Outputs Switching



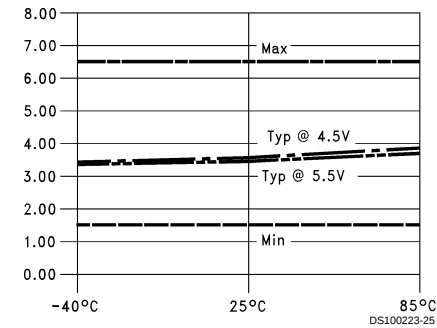
t_{PHZ} vs Temperature (T_A)
 $C_L = 50$ pF, 16 Outputs Switching



t_{PZL} vs Temperature (T_A)
 $C_L = 50$ pF, 16 Outputs Switching



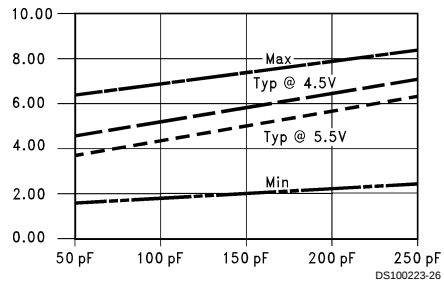
t_{PLZ} vs Temperature (T_A)
 $C_L = 50$ pF, 16 Outputs Switching



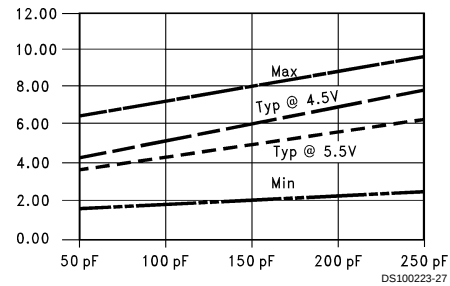
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Capacitance (Continued)

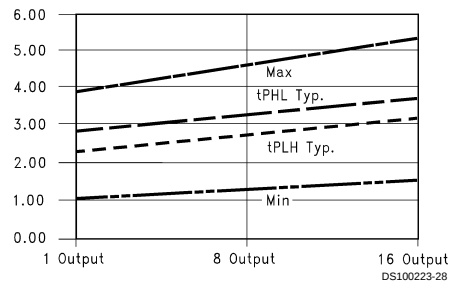
t_{PZL} vs Load Capacitance
16 Outputs Switching, $T_A = 25^\circ\text{C}$



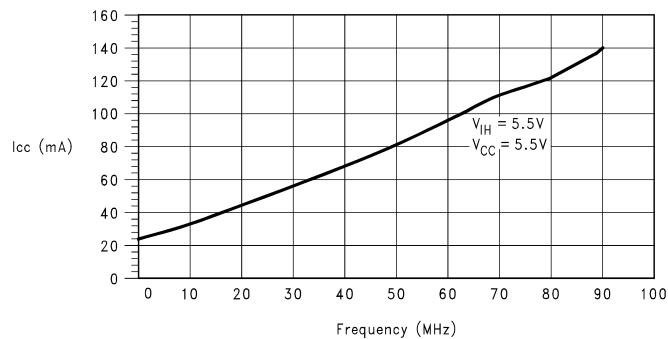
t_{PZH} vs Load Capacitance
16 Outputs Switching, $T_A = 25^\circ\text{C}$



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

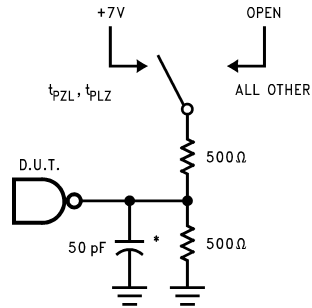


I_{CC} vs Frequency Average,
 $T_A = 25^\circ\text{C}$, $V_{CC} = 5.5\text{V}$



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

AC Loading



*Includes jig and probe capacitance

FIGURE 1. Standard AC Test Load

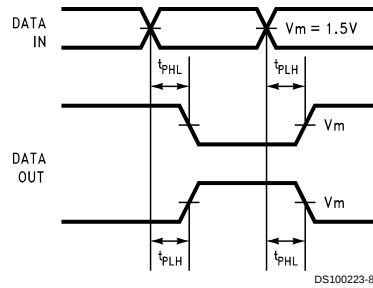


FIGURE 2. Propagation Delay Waveforms for Inverting and Non-Inverting Functions

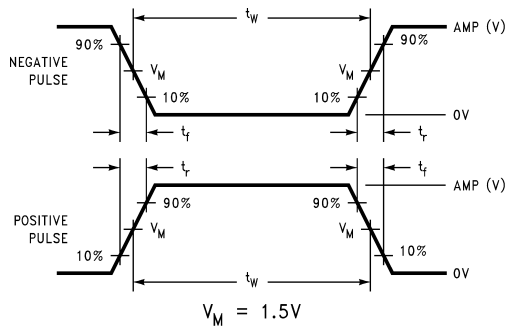


FIGURE 3. Test Input Pulse Requirements

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

FIGURE 4. Test Input Signal Requirements

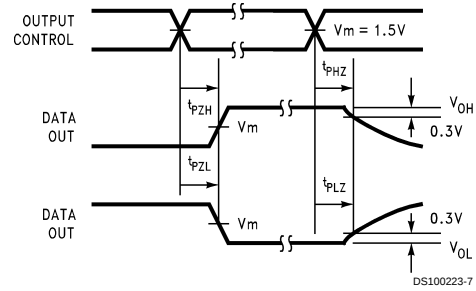
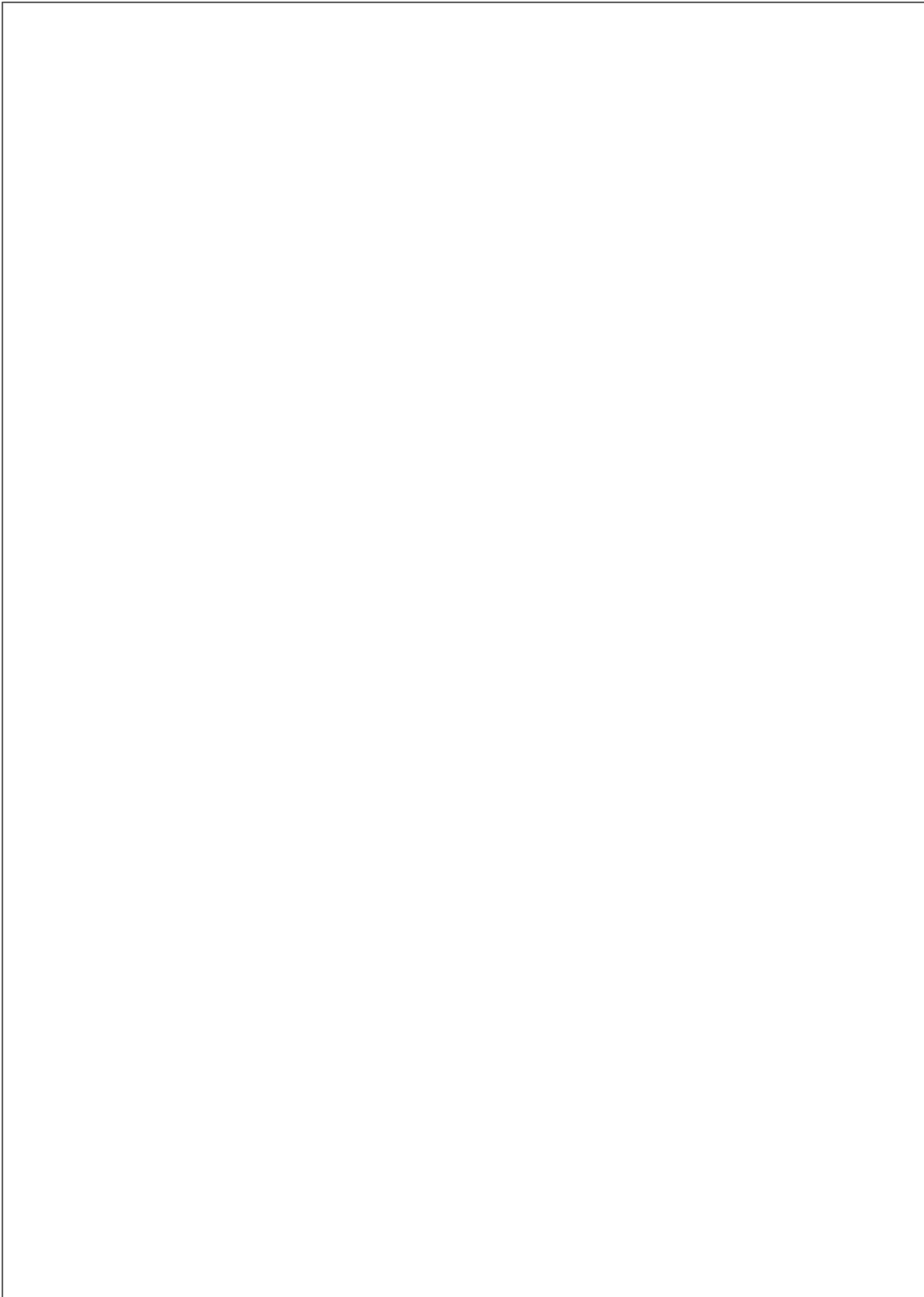
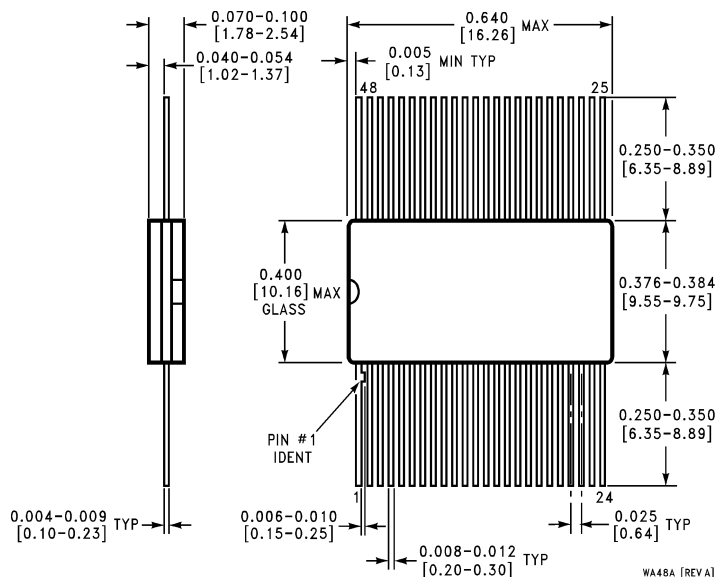


FIGURE 5. TRI-STATE Output HIGH and LOW Enable and Disable Times



Physical Dimensions inches (millimeters) unless otherwise noted



48-Lead Cerpack
NS Package Number WA48A

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