FAIRCHILD SEMICONDUCTOR™

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74ABT16952
16-Bit Registered Transceiver with 3-STATE Outputs

General Description

The ABT16952 is a 16-bit registered transceiver. Two 8-bit back to back registers store data flowing in both directions between two bidirectional buses. Separate clock, clock enable and 3-STATE output enable signals are provided for each register. The output pins are guaranteed to source 32 mA and to sink 64 mA.

Features

- Separate clock, clock enable and 3-STATE output enable provided for each register
- A and B output sink capability of 64 mA source capability of 32 mA
- Guaranteed latchup protection
- High impedance glitch free bus loading during entire power up and power down cycle
- Nondestructive hot insertion capability

Ordering Code:

Order Number	Package Number	Package Description
74ABT16952CSSC	MS56A	56-Lead Shrink Small Outline Package (SSOP), JEDEC MO-118, 0.300" Wide
74ABT16952CMTD	MTD56	56-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 6.1mm Wide

Devices also available in Tape and Reel. Specify by appending the letter suffix "X" to the ordering code.

Pin Descriptions

Pin Names	Description
A_0–A_{15}	Data Register A Inputs/ B-Register 3-STATE Outputs
B_0–B_{15}	Data Register B Inputs/ A-Register 3-STATE Outputs
$CPAB_n$, $CPBA_n$	Clock Pulse Inputs
$\overline{CEA}_n$, $\overline{CEB}_n$	Clock Enable
$\overline{OEAB}_n$, $\overline{OEBA}_n$	Output Enable Inputs

Output Control

$\overline{OE}$	Internal Q	Output	Function
H	X	Z	Disable Outputs
L	L	L	Enable Outputs
L	H	H	

Register Function Table

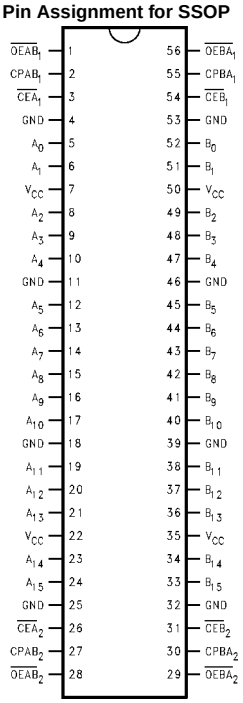
(Applies to A or B Register)

Inputs			Internal	
D	CP	$\overline{CE}$	Q	Function
X	X	H	NC	Hold Data
L	↗	L	L	Load Data
H	↗	L	H	

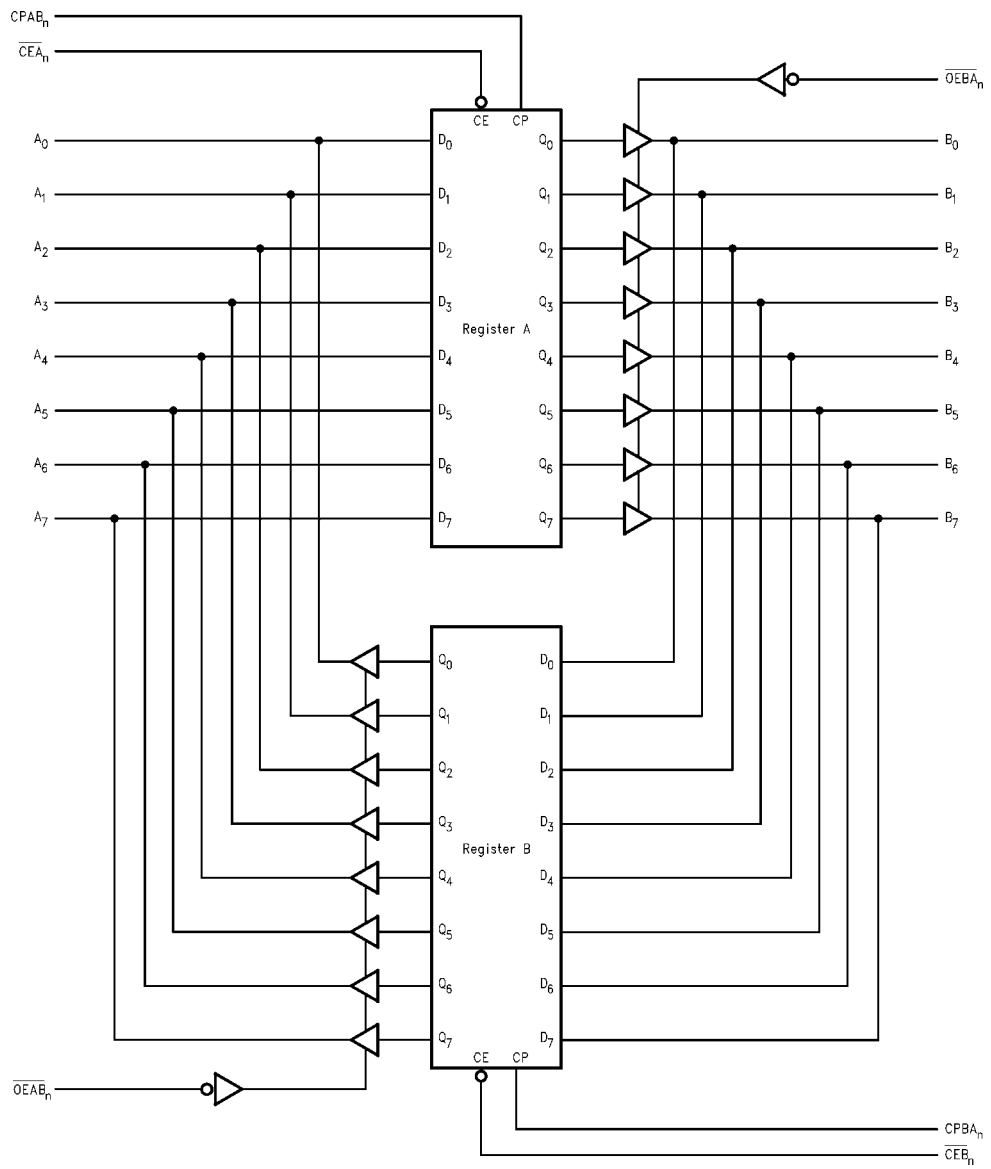
H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial
Z = HIGH Impedance
↗ = LOW-to-HIGH Transition
NC = No Change

Connection Diagram

Pin Assignment for SSOP



Block Diagram



n for either byte 1 or byte 2

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	−55°C to +150°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 Disable 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	−40°C to +85°C
Supply Voltage	+4.5V to +5.5V
Minimum Input Edge Rate (ΔV/Δt)	
Data Input	50 mV/ns
Enable Input	20 mV/ns
Clock Input	100 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	Min	Typ	Max	Units	V_{CC}	Conditions
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 (Non I/O Pins)
V_{OH}	Output HIGH Voltage	2.5					I_{OH} = −3 mA (A_n, B_n)
		2.0					I_{OH} = −32 mA (A_n, B_n)
V_{OL}	Output LOW Voltage			0.55			I_{OL} = 64 mA (A_n, B_n)
V_{ID}	Input Leakage Test	4.75			V	0.0	I_{ID} = 1.9 µA (Non-I/O Pins) All Other Pins Grounded
I_{IH}	Input HIGH Current			1	µA	Max	V_{IN} = 2.7V (Non-I/O Pins) (Note 4)
				1			V_{IN} = V_{CC} (Non-I/O Pins)
I_{BVI}	Input HIGH Current Breakdown Test			7	µA	Max	V_{IN} = 7.0V (Non-I/O Pins)
I_{BVIT}	Input HIGH Current Breakdown Test (I/O)			100	µA	Max	V_{IN} = 5.5V (A_n, B_n)
I_{IL}	Input LOW Current			−1	µA	Max	V_{IN} = 0.5V (Non-I/O Pins) (Note 4)
				−1			V_{IN} = 0.0V (Non-I/O Pins)
$I_{IH} + I_{OZH}$	Output Leakage Current			10	µA	0V–5.5V	V_{OUT} = 2.7V (A_n, B_n); $\overline{OEA}$ or $\overline{OEB}$ = 2.0V
$I_{IL} + I_{OZL}$	Output Leakage Current			−10	µA	0V–5.5V	V_{OUT} = 0.5V (A_n, B_n); $\overline{OEA}$ or $\overline{OEB}$ = 2.0V
I_{OS}	Output Short-Circuit Current	−100		−275	mA	Max	V_{OUT} = 0V (A_n, B_n)
I_{CEX}	Output HIGH Leakage Current			50	µA	Max	V_{OUT} = V_{CC} (A_n, B_n)
I_{ZZ}	Bus Drainage Test			100	µA	0.0V	V_{OUT} = 5.5V (A_n, B_n); All Others GND
I_{CCH}	Power Supply Current			1.0	mA	Max	All Outputs HIGH
I_{CCL}	Power Supply Current			60	mA	Max	All Outputs LOW
I_{CCZ}	Power Supply Current			1.0	mA	Max	Outputs 3-STATE; All Others GND
I_{CCT}	Additional I_{CC}/Input			2.5	mA	Max	V_I = V_{CC} − 2.1V; All Others at V_{CC} or GND
I_{CCD}	Dynamic I_{CC} No Load (Note 4)			0.18	mA/MHz	Max	Outputs Open $\overline{OEA}$ or $\overline{OEB}$ = GND, Non-I/O = GND or V_{CC} One Bit toggling, 50% duty cycle (Note 3)

Note 3: For 8-bit toggling, I_{CCD} <1.4 mA/MHz.

Note 4: Guaranteed, but not tested.

AC Electrical Characteristics

(SSOP Package)

Symbol	Parameter	$T_A = +25°C$, $V_{CC} = +5.0V$, $C_L = 50$ pF		$T_A = -40°C$ to $+85°C$, $V_{CC} = 4.5V$ to $5.5V$, $C_L = 50$ pF		Units
		Min	Max	Min	Max	
f_{max}	Max Clock Frequency	200		200		MHz
t_{PLH}	Propagation Delay	1.5	5.3	1.5	5.3	ns
t_{PHL}	$CPAB_n$ or $CPBA_n$ to A_n or B_n	1.5	5.3	1.5	5.3	
t_{PZH}	Output Enable Time	1.5	5.5	1.5	5.5	ns
t_{PZL}	$\overline{OEAB}_n$ or $\overline{OEBA}_n$ to A_n or B_n	1.5	5.5	1.5	5.5	
t_{PHZ}	Output Disable Time	1.5	6.0	1.5	6.0	ns
t_{PLZ}	$\overline{OEAB}_n$ or $\overline{OEBA}_n$ to A_n or B_n	1.5	6.0	1.5	6.0	

AC Operating Requirements

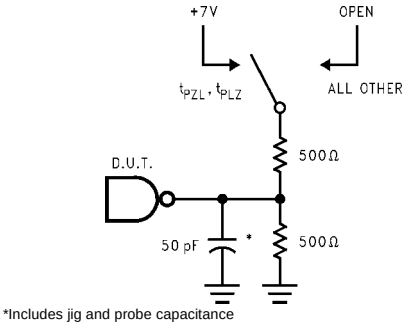
Symbol	Parameter	$T_A = +25°C$, $V_{CC} = +5.0V$, $C_L = 50$ pF		$T_A = -40°C$ to $+85°C$, $V_{CC} = 4.5V$ to $5.5V$, $C_L = 50$ pF		Units
		Min	Max	Min	Max	
$t_S(H)$	Setup Time, HIGH	2.5		2.5		ns
$t_S(L)$	or LOW A_n or B_n	2.5		2.5		
	to $\overline{CPAB}_n$ or $\overline{CPBA}_n$					
$t_H(H)$	Hold Time, HIGH	1.5		1.5		ns
$t_H(L)$	or LOW A_n or B_n	1.5		1.5		
	to $\overline{CPAB}_n$ or $\overline{CPBA}_n$					
$t_S(H)$	Setup Time, HIGH	2.5		2.5		ns
$t_S(L)$	or LOW $\overline{CEA}_n$ or $\overline{CEB}_n$	2.5		2.5		
	to $\overline{CPAB}_n$ or $\overline{CPBA}_n$					
$t_H(H)$	Hold Time, HIGH	1.5		1.5		ns
$t_H(L)$	or LOW $\overline{CEA}_n$ or $\overline{CEB}_n$	1.5		1.5		
	to $\overline{CPAB}_n$ or $\overline{CPBA}_n$					
$t_W(H)$	Pulse Width,	3.0		3.0		ns
$t_W(L)$	HIGH or LOW	3.0		3.0		
	to $\overline{CPAB}_n$ or $\overline{CPBA}_n$					

Capacitance

Symbol	Parameter	Typ	Units	Conditions $T_A = 25°C$
C_{IN}	Input Capacitance	5	pF	$V_{CC} = 0V$ (Non I/O Pins)
$C_{I/O}$ (Note 5)	Output Capacitance	11	pF	$V_{CC} = 5.0V$ (A_n, B_n)

Note 5: $C_{I/O}$ is measured at frequency f = 1 MHz, per MIL-STD-883, Method 3012.

AC Loading



*Includes jig and probe capacitance

FIGURE 1. Standard AC Test Load

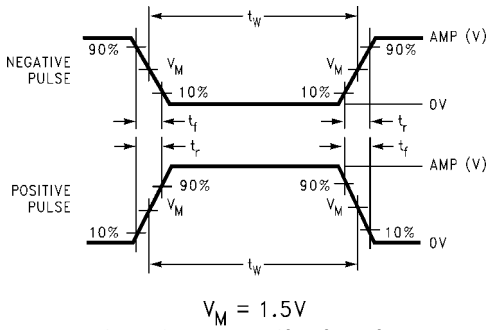


FIGURE 2. Test Input Signal Levels

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

FIGURE 3. Input Signal Requirements

AC Waveforms

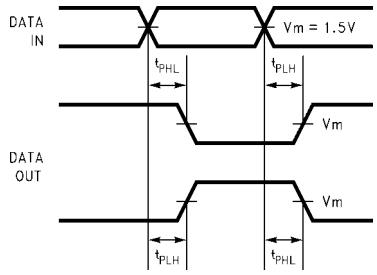


FIGURE 4. Propagation Delay Waveforms for Inverting and Non-Inverting Functions

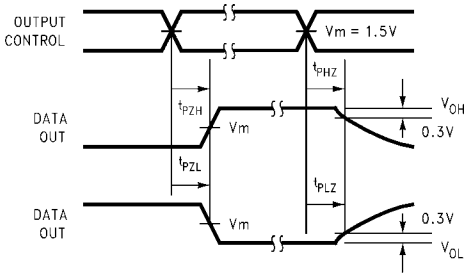


FIGURE 6. 3-STATE Output HIGH and LOW Enable and Disable Times

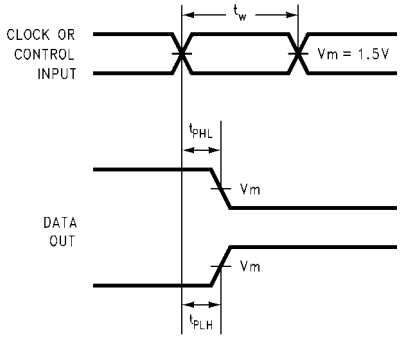


FIGURE 5. Propagation Delay, Pulse Width Waveforms

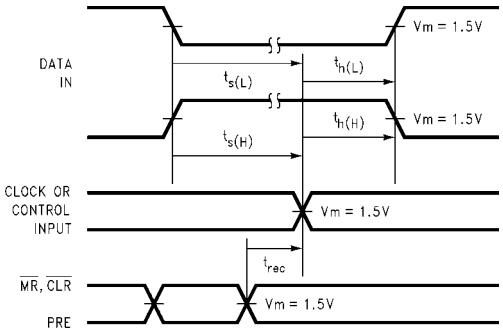
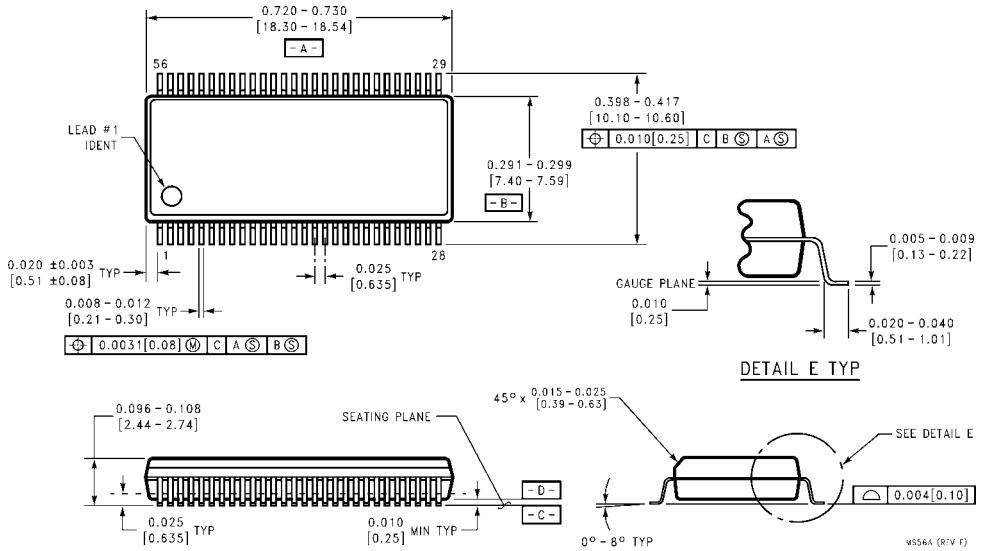


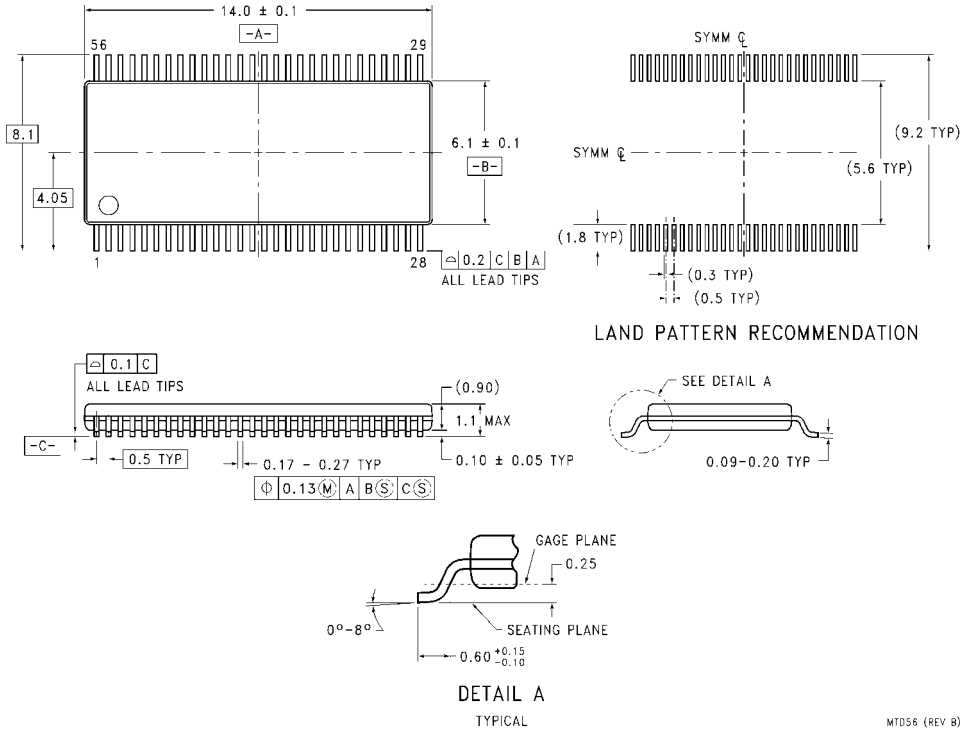
FIGURE 7. Setup Time, Hold Time and Recovery Time Waveforms

Physical Dimensions inches (millimeters) unless otherwise noted



56-Lead Shrink Small Outline Package (SSOP), JEDEC MO-118, 0.300" Wide
Package Number MS56A

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



56-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 6.1mm Wide
Package Number MTD56

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