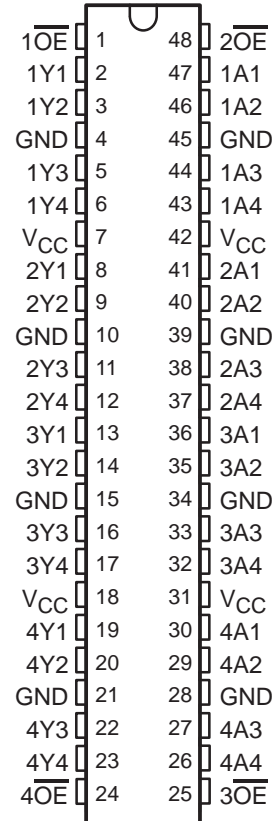


SN54ABT162244, SN74ABT162244 16-BIT BUFFERS/DRIVERS WITH 3-STATE OUTPUTS

SCBS238D – JUNE 1992 – REVISED MAY 1997

- Members of the Texas Instruments *Widebus*™ Family
- Output Ports Have Equivalent 25-Ω Series Resistors, So No External Resistors Are Required
- State-of-the-Art *EPIC-II B*™ BiCMOS Design Significantly Reduces Power Dissipation
- Latch-Up Performance Exceeds 500 mA Per JEDEC Standard JESD-17
- Typical V_{OLP} (Output Ground Bounce) < 1 V at $V_{CC} = 5$ V, $T_A = 25^\circ\text{C}$
- High-Impedance State During Power Up and Power Down
- Distributed V_{CC} and GND Pin Configuration Minimizes High-Speed Switching Noise
- Flow-Through Architecture Optimizes PCB Layout
- Package Options Include Plastic 300-mil Shrink Small-Outline (DL), Thin Shrink Small-Outline (DGG), and Thin Very Small-Outline (DGV) Packages and 380-mil Fine-Pitch Ceramic Flat (WD) Package Using 25-mil Center-to-Center Spacings

SN54ABT162244 . . . WD PACKAGE
SN74ABT162244 . . . DGG, DGV, OR DL PACKAGE
(TOP VIEW)



description

The 'ABT162244 are 16-bit buffers and line drivers designed specifically to improve both the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters. These devices can be used as four 4-bit buffers, two 8-bit buffers, or one 16-bit buffer. These devices provide noninverting outputs and symmetrical active-low output-enable (\overline{OE}) inputs.

The outputs, which are designed to source or sink up to 12 mA, include equivalent 25-Ω series resistors to reduce overshoot and undershoot.

When V_{CC} is between 0 and 2.1 V, the device is in the high-impedance state during power up or power down. However, to ensure the high-impedance state above 2.1 V, \overline{OE} should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

The SN54ABT162244 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ABT162244 is characterized for operation from -40°C to 85°C .



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

Widebus and EPIC-II B are trademarks of Texas Instruments Incorporated.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

 **TEXAS
INSTRUMENTS**

POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

Copyright © 1997, Texas Instruments Incorporated

SN54ABT162244, SN74ABT162244

16-BIT BUFFERS/DRIVERS

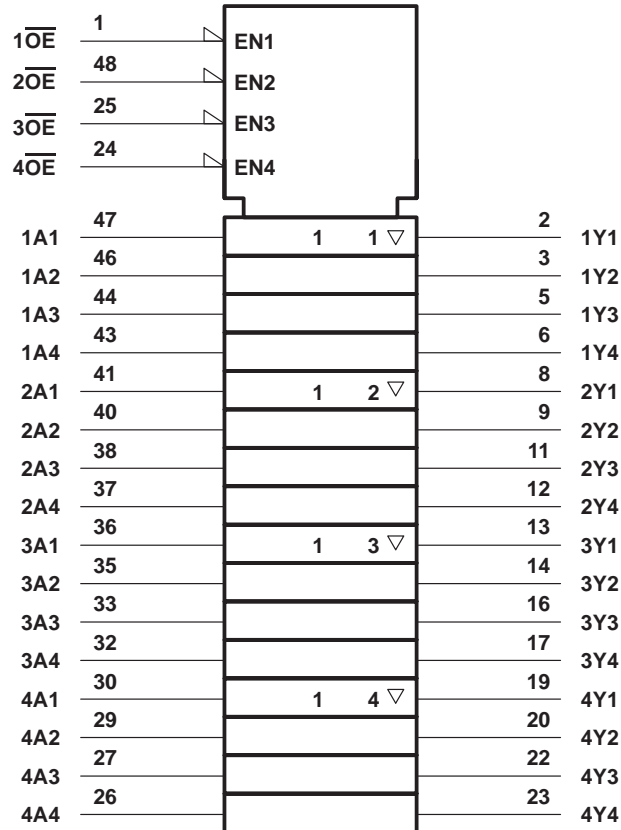
WITH 3-STATE OUTPUTS

SCBS238D – JUNE 1992 – REVISED MAY 1997

FUNCTION TABLE
(each 4-bit 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.

SN54ABT162244, SN74ABT162244

16-BIT BUFFERS/DRIVERS

WITH 3-STATE OUTPUTS

SCBS238D – JUNE 1992 – REVISED MAY 1997

recommended operating conditions (see Note 3)

		SN54ABT162244		SN74ABT162244		UNIT
		MIN	MAX	MIN	MAX	
V_{CC}	Supply voltage	4.5	5.5	4.5	5.5	V
V_{IH}	High-level input voltage	2		2		V
V_{IL}	Low-level input voltage		0.8		0.8	V
V_I	Input voltage	0	V_{CC}	0	V_{CC}	V
I_{OH}	High-level output current		-12		-12	mA
I_{OL}	Low-level output current		12		12	mA
$\Delta t/\Delta v$	Input transition rise or fall rate	Outputs enabled		10	10	ns/V
$\Delta t/\Delta V_{CC}$	Power-up ramp rate	200		200		$\mu s/V$
T_A	Operating free-air temperature	-55	125	-40	85	$^{\circ}C$

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



SN54ABT162244, SN74ABT162244
16-BIT BUFFERS/DRIVERS
WITH 3-STATE OUTPUTS

SCBS238D – JUNE 1992 – REVISED MAY 1997

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

PARAMETER	TEST CONDITIONS	T _A = 25°C			SN54ABT162244		SN74ABT162244		UNIT
		MIN	TYP†	MAX	MIN	MAX	MIN	MAX	
V _{IK}	V _{CC} = 4.5 V, I _I = -18 mA			-1.2		-1.2		-1.2	V
V _{OH}	V _{CC} = 4.5 V, I _{OH} = -1 mA	3.35			3.35			3.35	V
	V _{CC} = 5 V, I _{OH} = -1 mA	3.85			3.85			3.85	
	V _{CC} = 4.5 V	I _{OH} = -3 mA	3.1			3.1			
I _{OH} = -12 mA		2.6*						2.6	
V _{OL}	V _{CC} = 4.5 V	I _{OL} = 8 mA	0.4	0.8		0.8		0.65	V
		I _{OL} = 12 mA						0.8	
V _{hys}			100						mV
I _I	V _{CC} = 0 to 5.5 V, V _I = V _{CC} or GND			±1		±1		±1	μA
I _{OZPU} ‡	V _{CC} = 0 to 2.1 V, V _O = 0.5 V to 2.7 V, $\overline{OE} = X$			±50		±50		±50	μA
I _{OZPD} ‡	V _{CC} = 2.1 V to 0, V _O = 0.5 V to 2.7 V, $\overline{OE} = X$			±50		±50		±50	μA
I _{OZH}	V _{CC} = 2.1 V to 5.5 V, V _O = 2.7 V, $\overline{OE} \geq 2$ V			10		10		10	μA
I _{OZL}	V _{CC} = 2.1 V to 5.5 V, V _O = 0.5 V, $\overline{OE} \geq 2$ V			-10		-10		-10	μA
I _{off}	V _{CC} = 0, V _I or V _O ≤ 4.5 V			±100				±100	μA
I _{CEX}	V _{CC} = 5.5 V, V _O = 5.5 V			50		50		50	μA
I _O §	V _{CC} = 5.5 V, V _O = 2.5 V	-25	-55	-100	-25	-100	-25	-100	mA
I _{CC}	V _{CC} = 5.5 V, I _O = 0, V _I = V _{CC} or GND	Outputs high		2		2		2	mA
		Outputs low		30		30		30	
		Outputs disabled		2		2		2	
ΔI _{CC} ¶	Data inputs	V _{CC} = 5.5 V, One input at 3.4 V, Other inputs at V _{CC} or GND	Outputs enabled		50		50		μA
			Outputs disabled		50		50		
	Control inputs	V _{CC} = 5.5 V, One input at 3.4 V, Other inputs at V _{CC} or GND		50		50		50	
C _i	V _I = 2.5 V or 0.5 V			3					pF
C _o	V _O = 2.5 V or 0.5 V			8					pF

* On products compliant to MIL-PRF-38535, this parameter does not apply.

† All typical values are at V_{CC} = 5 V.

‡ This parameter is characterized, but not production tested.

§ Not more than one output should be tested at a time, and the duration of the test should not exceed one second.

¶ This is the increase in supply current for each input that is at the specified TTL voltage level rather than V_{CC} or GND.



SN54ABT162244, SN74ABT162244

16-BIT BUFFERS/DRIVERS

WITH 3-STATE OUTPUTS

SCBS238D – JUNE 1992 – REVISED MAY 1997

switching characteristics over recommended ranges of supply voltage and operating free-air temperature, $C_L = 50$ pF (unless otherwise noted) (see Figure 1)

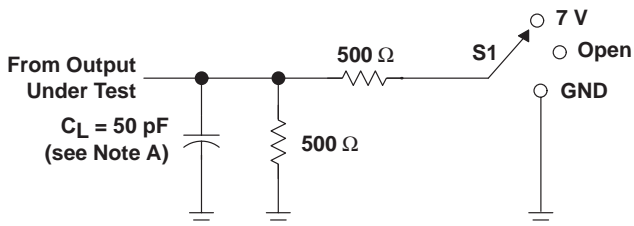
PARAMETER	FROM (INPUT)	TO (OUTPUT)	SN54ABT162244					UNIT
			$V_{CC} = 5$ V, $T_A = 25^\circ$ C			MIN	MAX	
			MIN	TYP	MAX			
t_{PLH}	A	Y	1	2.5	3.6	1	4.1	ns
t_{PHL}			1	3.1	4.7	1	5.3	
t_{PZH}	\overline{OE}	Y	1	3.2	4.8	1	5.6	ns
t_{PZL}			1	3.2	4.7	1	5.5	
t_{PHZ}	\overline{OE}	Y	1	3.2	5.3	1	6.3	ns
t_{PLZ}			1	3.1	4.6	1	4.9	

switching characteristics over recommended ranges of supply voltage and operating free-air temperature, $C_L = 50$ pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	SN74ABT162244					UNIT
			$V_{CC} = 5$ V, $T_A = 25^\circ$ C			MIN	MAX	
			MIN	TYP	MAX			
t_{PLH}	A	Y	1	2.5	3.2	1	3.9	ns
t_{PHL}			1	3.1	4	1	4.8	
t_{PZH}	\overline{OE}	Y	1	3.2	4.2	1	5.4	ns
t_{PZL}			1	3.2	4.1	1	5.1	
t_{PHZ}	\overline{OE}	Y	1	3.2	4	1	4.6	ns
t_{PLZ}			1	3.1	3.9	1	4.5	

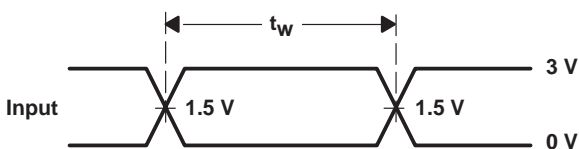


PARAMETER MEASUREMENT INFORMATION

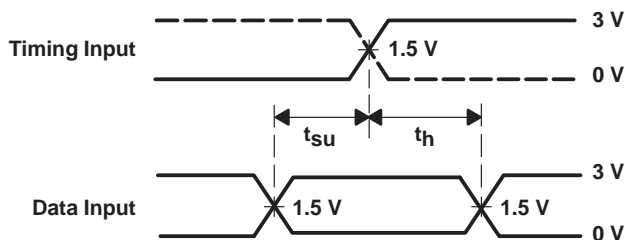


TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	7 V
t_{PHZ}/t_{PZH}	Open

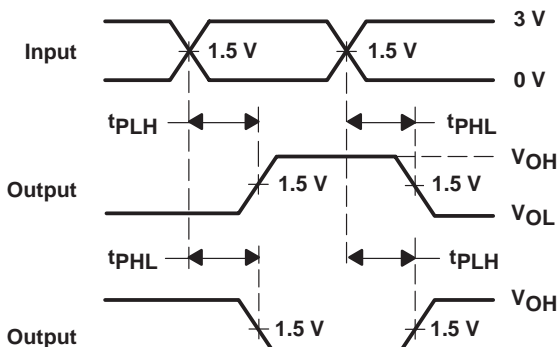
LOAD CIRCUIT



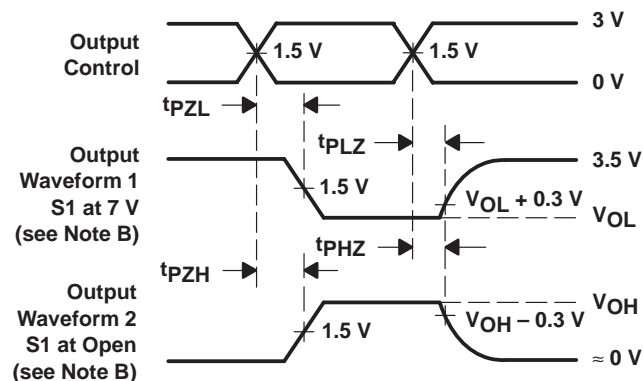
VOLTAGE WAVEFORMS
PULSE DURATION



VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES
INVERTING AND NONINVERTING OUTPUTS



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES
LOW- AND HIGH-LEVEL ENABLING

- 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: $PRR \leq 10$ MHz, $Z_O = 50 \Omega$, $t_r \leq 2.5$ ns, $t_f \leq 2.5$ ns.
 D. The outputs are measured one at a time with one transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

IMPORTANT NOTICE

Texas Instruments and its subsidiaries (TI) reserve the right to make changes to their products or to discontinue any product or service without notice, and advise customers to obtain the latest version of relevant information to verify, before placing orders, that information being relied on is current and complete. All products are sold subject to the terms and conditions of sale supplied at the time of order acknowledgement, including those pertaining to warranty, patent infringement, and limitation of liability.

TI warrants performance of its semiconductor products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are utilized to the extent TI deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except those mandated by government requirements.

CERTAIN APPLICATIONS USING SEMICONDUCTOR PRODUCTS MAY INVOLVE POTENTIAL RISKS OF DEATH, PERSONAL INJURY, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE ("CRITICAL APPLICATIONS"). TI SEMICONDUCTOR PRODUCTS ARE NOT DESIGNED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS. INCLUSION OF TI PRODUCTS IN SUCH APPLICATIONS IS UNDERSTOOD TO BE FULLY AT THE CUSTOMER'S RISK.

In order to minimize risks associated with the customer's applications, adequate design and operating safeguards must be provided by the customer to minimize inherent or procedural hazards.

TI assumes no liability for applications assistance or customer product design. TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right of TI covering or relating to any combination, machine, or process in which such semiconductor products or services might be or are used. TI's publication of information regarding any third party's products or services does not constitute TI's approval, warranty or endorsement thereof.

PRODUCT FOLDER | PRODUCT INFO: [FEATURES](#) | [DESCRIPTION](#) | [DATASHEETS](#) | [PRICING/AVAILABILITY/PKG](#) | [APPLICATION NOTES](#) | [USER GUIDES](#) | [MORE LITERATURE](#)

PRODUCT SUPPORT: [TRAINING](#)

SN54ABT162244, 16-Bit Buffers/Drivers With 3-State Outputs

DEVICE STATUS: **ACTIVE**

PARAMETER NAME	SN54ABT162244	SN74ABT162244
Voltage Nodes (V)	5	5
V _{CC} range (V)	4.5 to 5.5	4.5 to 5.5
Input Level	TTL	TTL
Output Level	TTL	TTL
No. of Outputs	16	
Output Drive (mA)		-12/12
tpd max (ns)		4.8
Static Current		16
Logic	True	

FEATURES

[▲Back to Top](#)

- Members of the Texas Instruments **Widebus**[™] Family
- Output Ports Have Equivalent 25- Series Resistors, So No External Resistors Are Required
- State-of-the-Art **EPIC-II B**[™] BiCMOS Design Significantly Reduces Power Dissipation
- Latch-Up Performance Exceeds 500 mA Per JEDEC Standard JESD-17
- Typical V_{OLP} (Output Ground Bounce) < 1 V at V_{CC} = 5 V, T_A = 25°C
- High-Impedance State During Power Up and Power Down
- Distributed V_{CC} and GND Pin Configuration Minimizes High-Speed Switching Noise
- Flow-Through Architecture Optimizes PCB Layout
- Package Options Include Plastic 300-mil Shrink Small-Outline (DL), Thin Shrink Small-Outline (DGG), and Thin Very Small-Outline (DGV) Packages and 380-mil Fine-Pitch Ceramic Flat (WD) Package Using 25-mil Center-to-Center Spacings

Widebus and EPIC-IIB are trademarks of Texas Instruments Incorporated.

DESCRIPTION

[▲Back to Top](#)

The 'ABT162244 are 16-bit buffers and line drivers designed specifically to improve both the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters. These devices can be used as four 4-bit buffers, two 8-bit buffers, or one 16-bit buffer. These devices provide noninverting outputs and symmetrical active-low output-enable (OE\) inputs.

The outputs, which are designed to source or sink up to 12 mA, include equivalent 25- series resistors to reduce overshoot and undershoot.

When V_{CC} is between 0 and 2.1 V, the device is in the high-impedance state during power up or power down. However, to ensure the high-impedance state above 2.1 V, OE\ should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

The SN54ABT162244 is characterized for operation over the full military temperature range of -55°C to 125°C. The SN74ABT162244 is characterized for operation from -40°C to 85°C.

TECHNICAL DOCUMENTS

[▲Back to Top](#)

To view the following documents, [Acrobat Reader 4.0](#) is required.

To download a document to your hard drive, right-click on the link and choose 'Save'.

DATASHEET

[▲ Back to Top](#)

Full datasheet in Acrobat PDF: [sn54abt162244.pdf](#) (117 KB, Rev.D) (Updated: 05/01/1997)

APPLICATION NOTES

[▲ Back to Top](#)

View Application Notes for [Digital Logic](#)

- [Advanced BiCMOS Technology \(ABT\) Logic Characterization Information \(Rev. B\)](#) (SCBA008B - Updated: 06/01/1997)
- [Advanced BiCMOS Technology \(ABT\) Logic Enables Optimal System Design \(Rev. A\)](#) (SCBA001A - Updated: 03/01/1997)
- [Bus-Interface Devices With Output-Damping Resistors Or Reduced-Drive Outputs \(Rev. A\)](#) (SCBA012A - Updated: 08/01/1997)
- [Designing With Logic \(Rev. C\)](#) (SDYA009C - Updated: 06/01/1997)
- [Evaluation of Nickel/Palladium/Gold-Finished Surface-Mount Integrated Circuits](#) (SZZA026 - Updated: 06/20/2001)
- [Family of Curves Demonstrating Output Skews for Advanced BiCMOS Devices \(Rev. A\)](#) (SCBA006A - Updated: 12/01/1996)
- [Implications of Slow or Floating CMOS Inputs \(Rev. C\)](#) (SCBA004C - Updated: 02/01/1998)
- [Input and Output Characteristics of Digital Integrated Circuits](#) (SDYA010 - Updated: 10/01/1996)
- [Live Insertion](#) (SDYA012 - Updated: 10/01/1996)
- [Power-Up 3-State \(PU3S\) Circuits in TI Standard Logic Devices](#) (SZZA033 - Updated: 05/10/2002)
- [Quad Flatpack No-Lead Logic Packages \(Rev. C\)](#) (SCBA017C - Updated: 11/22/2002)
- [TI IBIS File Creation, Validation, and Distribution Processes](#) (SZZA034 - Updated: 08/29/2002)
- [Understanding Advanced Bus-Interface Products Design Guide](#) (SCAA029, 253 KB - Updated: 05/01/1996)
- [Understanding and Interpreting Texas Instruments Standard-Logic Products Data Sh \(Rev. A\)](#) (SZZA036A - Updated: 02/27/2003)

MORE LITERATURE

[▲ Back to Top](#)

- [Enhanced Plastic Portfolio Brochure](#) (SGZB004, 387 KB - Updated: 08/19/2002)
- [Logic Reference Guide](#) (SCYB004, 1032 KB - Updated: 10/23/2001)
- [MicroStar Junior BGA Design Summary](#) (SCET004, 167 KB - Updated: 07/28/2000)
- [Military Brief](#) (SGYN138, 803 KB - Updated: 10/10/2000)
- [Overview of IEEE Std 91-1984, Explanation of Logic Symbols Training Booklet \(Rev. A\)](#) (SDYZ001A, 138 KB - Updated: 07/01/1996)
- [Palladium Lead Finish User's Manual](#) (SDYV001, 2041 KB - Updated: 11/01/1996)
- [QML Class V Space Products Military Brief \(Rev. A\)](#) (SGZN001A, 257 KB - Updated: 10/07/2002)

USER GUIDES

[▲ Back to Top](#)

- [LOGIC Pocket Data Book](#) (SCYD013, 4837 KB - Updated: 12/05/2002)

PRICING/AVAILABILITY/PKG

[▲ Back to Top](#)

DEVICE INFORMATION Updated Daily								TI INVENTORY STATUS As Of 09:00 AM GMT, 17 Apr 2003			REPORTED DISTRIBUTOR INVENTORY As Of 09:00 AM GMT, 17 Apr 2003		
ORDERABLE DEVICE	STATUS	PACKAGE TYPE PINS	TEMP (°C)	DSCC NUMBER	PRODUCT CONTENT	BUDGETARY PRICING QTY SUS	STD PACK QTY	IN STOCK	IN PROGRESS QTY DATE	LEAD TIME	DISTRIBUTOR COMPANY REGION	IN STOCK	PURCHASE
5962-9458701QXA	ACTIVE	CFP (WD) 48	-55 TO 125		View Contents	1KU 22.39	1	2*	81 12 May	8 WKS	Avnet Americas	66	BUY NOW
									33 19 May				
									> 10k 20 May				
SNJ54ABT162244WD	ACTIVE	CFP (WD) 48	-55 TO 125	5962-9458701QXA	View Contents	1KU 22.39	1	0*	94 21 Apr	8 WKS	None Reported View Distributors		
									> 10k 20 May				

Table Data Updated on: 4/17/2003



[Products](#) | [Applications](#) | [Support](#) | [my.TI](#)

© Copyright 1995-2002 Texas Instruments Incorporated. All rights reserved.

[Trademarks](#) | [Privacy Policy](#) | [Terms of Use](#)