

SN54ACT1284, SN74ACT1284 7-BIT BUS INTERFACES WITH 3-STATE OUTPUTS

SCAS459D – NOVEMBER 1994 – REVISED OCTOBER 2003

- 4.5-V to 5.5-V V_{CC} Operation
- Inputs Accept Voltages to 5.5 V
- Max t_{pd} of 20 ns at 5 V
- 3-State Outputs Directly Drive Bus Lines
- Flow-Through Architecture Optimizes PCB Layout
- Center-Pin V_{CC} and GND Configurations Minimize High-Speed Switching Noise
- ESD Protection Exceeds JESD 22
 - 2000-V Human-Body Model (A114-A)
 - 200-V Machine Model (A115-A)
- Designed for the IEEE 1284-I (Level-1 Type) and IEEE 1284-II (Level-2 Type) Electrical Specifications

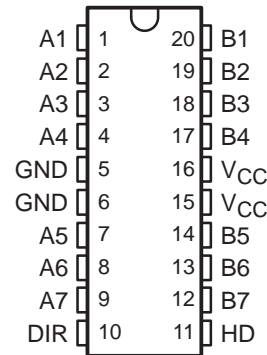
description/ordering information

The 'ACT1284 devices are designed for asynchronous two-way communication between data buses. The control function minimizes external timing requirements.

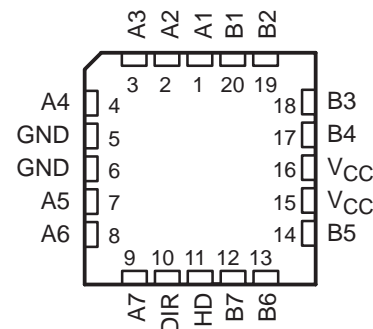
The devices allow data transmission in either the A-to-B or the B-to-A direction for bits 1, 2, 3, and 4, depending on the logic level at the direction-control (DIR) input. Bits 5, 6, and 7, however, always transmit in the A-to-B direction.

The output drive for each mode is determined by the high-drive (HD) control pin. When HD is high, the high drive is delivered by the totem-pole configuration, and when HD is low, the outputs are open drain. This meets the drive requirements as specified in the IEEE 1284-I (level-1 type) and the IEEE 1284-II (level-2 type) parallel peripheral-interface specification.

SN54ACT1284 . . . J OR W PACKAGE
SN74ACT1284 . . . DB, DW, NS, OR PW PACKAGE
(TOP VIEW)



SN54ACT1284 . . . FK PACKAGE
(TOP VIEW)



ORDERING INFORMATION

T_A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
0°C to 70°C	SOIC – DW	Tube	SN74ACT1284DW	ACT1284
		Tape and reel	SN74ACT1284DWR	
	SOP – NS	Tape and reel	SN74ACT1284NSR	ACT1284
	SSOP – DB	Tape and reel	SN74ACT1284DBR	AU284
–55°C to 125°C	TSSOP – PW	Tube	SN74ACT1284PW	AU284
		Tape and reel	SN74ACT1284PWR	
	CDIP – J	Tube	SNJ54ACT1284J	SNJ54ACT1284J
	CFP – W	Tube	SNJ54ACT1284W	SNJ54ACT1284W
	LCCC – FK	Tube	SNJ54ACT1284FK	SNJ54ACT1284FK

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.



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.

UNLESS OTHERWISE NOTED this document contains PRODUCTION DATA information 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 © 2003, Texas Instruments Incorporated

SN54ACT1284, SN74ACT1284

7-BIT BUS INTERFACES

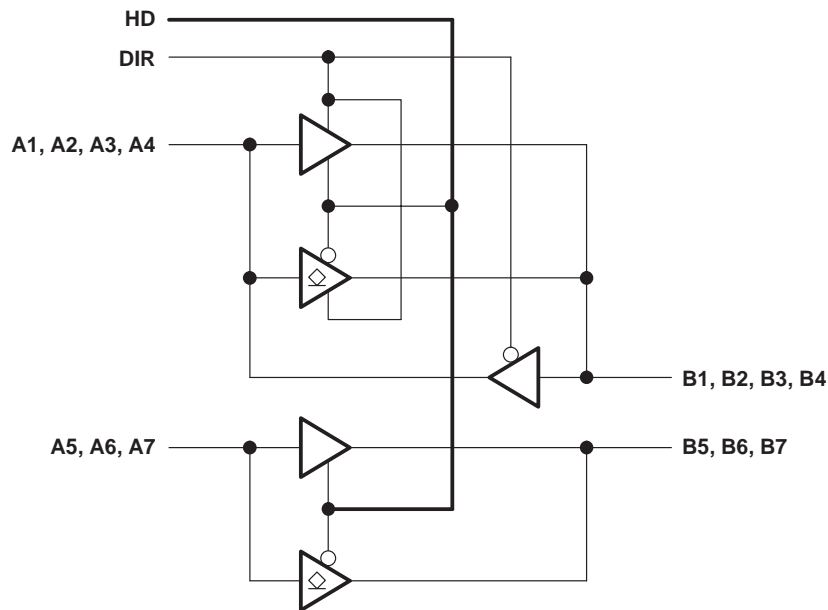
WITH 3-STATE OUTPUTS

SCAS459D – NOVEMBER 1994 – REVISED OCTOBER 2003

FUNCTION TABLE

INPUTS		OUTPUT	MODE
DIR	HD		
L	L	Open drain	A to B: Bits 5, 6, 7
		Totem pole	B to A: Bits 1, 2, 3, 4
L	H	Totem pole	B to A: Bits 1, 2, 3, 4 and A to B: Bits 5, 6, 7
H	L	Open drain	A to B: Bits 1, 2, 3, 4, 5, 6, 7
H	H	Totem pole	A to B: Bits 1, 2, 3, 4, 5, 6, 7

logic diagram (positive logic)



SN54ACT1284, SN74ACT1284 7-BIT BUS INTERFACES WITH 3-STATE OUTPUTS

SCAS459D – NOVEMBER 1994 – REVISED OCTOBER 2003

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage range, V_{CC}	-0.5 V to 7 V
B-port input and output voltage range, V_I and V_O (see Notes 1 and 2)	-2 V to 7 V
A-port input and output voltage range, V_I and V_O (see Note 1)	-0.5 V to $V_{CC} + 0.5$ V
Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$)	± 20 mA
Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$)	± 50 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC})	± 50 mA
Continuous current through V_{CC} or GND	± 200 mA
Package thermal impedance, θ_{JA} (see Note 3): DB package	70°C/W
DW package	58°C/W
NS package	60°C/W
PW package	83°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 ac input voltage pulse duration is limited to 20 ns if the input voltage goes more negative than -0.5 V.
 3. The package thermal impedance is calculated in accordance with JESD 51-7.

recommended operating conditions (see Note 4)

			SN54ACT1284		SN74ACT1284		UNIT
			MIN	MAX	MIN	MAX	
V_{CC}	Supply voltage		4.7	5.5	4.7	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
V_O	Open-drain output voltage	HD low	0	5.5	0	5.5	V
		B port, HD high		-14		-14	mA
I_{OH}	High-level output current	A port		-4		-4	
		B port		14		14	mA
I_{OL}	Low-level output current	A port		4		4	
T_A	Operating free-air temperature		-55	125	0	70	°C

NOTE 4: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

SN54ACT1284, SN74ACT1284

7-BIT BUS INTERFACES

WITH 3-STATE OUTPUTS

SCAS459D – NOVEMBER 1994 – REVISED OCTOBER 2003

electrical characteristics over recommended ranges of operating free-air temperature and supply voltage (unless otherwise noted)

PARAMETER		TEST CONDITIONS	V _{CC} †	SN54ACT1284			SN74ACT1284			UNIT
				MIN	TYP	MAX	MIN	TYP	MAX	
V _{hys}	Input hysteresis	V _{IT+} – V _{IT-} for all inputs	5 V	0.4			0.4			V
			4.7 V	0.2			0.2			
V _{OH}	B port	I _{OH} = –14 mA	4.7 V	2.4			2.4			V
	A port	I _{OH} = –50 μA	MIN to MAX	V _{CC} –0.2			V _{CC} –0.2			
		I _{OH} = –4 mA	4.7 V	3.7			3.7			
V _{OL}	B port	I _{OL} = 14 mA	4.7 V				0.4			V
	A port	I _{OL} = 50 μA	4.7 V				0.2			
		I _{OL} = 4 mA					0.4			
I _I		V _I = V _{CC} or GND	5.5 V				±1			μA
I _{OZ}	A or B ports‡	V _O = V _{CC} or GND	5.5 V				±20			μA
I _{off}	B port	V _I or V _O ≤ 7 V	0 V				±100			μA
I _{CC}		V _I = V _{CC} or GND, I _O = 0	5.5 V				1.5			mA
C _i	Control inputs	V _I = V _{CC} or GND	5 V	4			4			pF
C _{io}	A or B ports	V _O = V _{CC} or GND	5 V	12			12			pF
Z _O	B port	I _{OH} = –20 mA, I _{OH} = –50 mA	5 V	8	30		8	30		Ω

† For I/O ports, the parameter I_{OZ} includes the input leakage current I_I.

‡ For conditions shown as MIN or MAX, use the appropriate values under recommended operating conditions.

switching characteristics over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Figure 1)

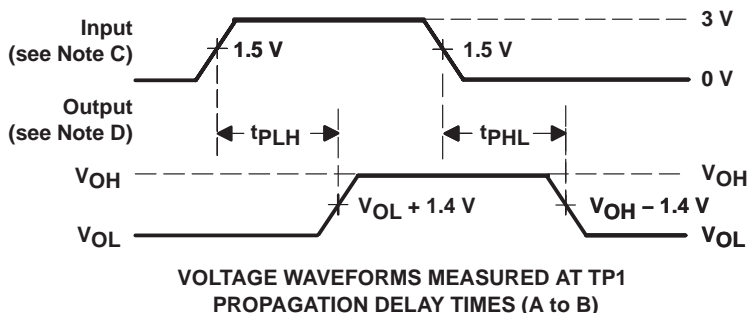
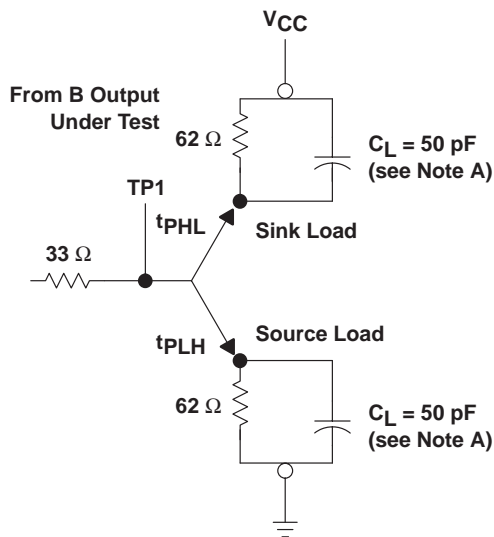
PARAMETER		FROM (INPUT)	TO (OUTPUT)	SN54ACT1284		SN74ACT1284		UNIT
				MIN	MAX	MIN	MAX	
t _{PLH}	Totem pole	A or B	B or A	1	20	1	20	ns
t _{PHL}				1	20	1	20	
SR	Totem pole	B output		0.05	0.4	0.05	0.4	V/ns
t _{pd(EN)}	Totem pole	HD	B	1	20	1	20	ns
t _{pd(DIS)}				1	20	1	20	
t _r , t _f	Open drain	A	B	120		120		ns

PRODUCT PREVIEW information concerns products in the formative or design phase of development. Characteristic data and other specifications are design goals. Texas Instruments reserves the right to change or discontinue these products without notice.

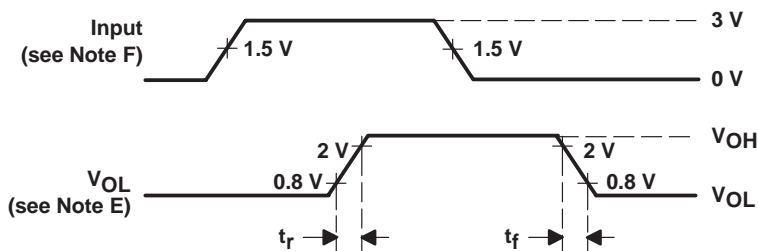
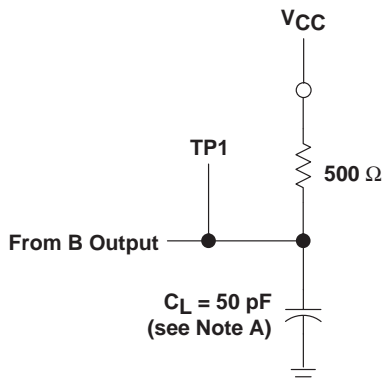


POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

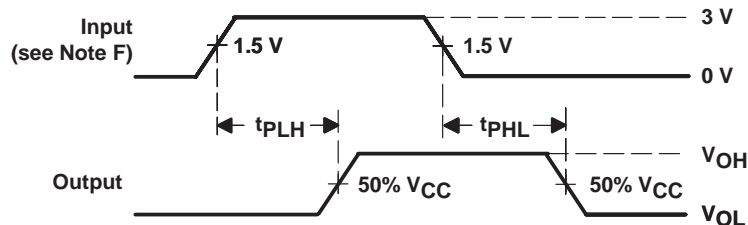
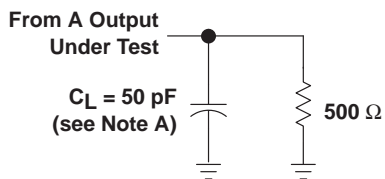
PARAMETER MEASUREMENT INFORMATION



A-TO-B LOAD (totem pole)



A-TO-B LOAD (open drain)



B-TO-A LOAD (totem pole)

- NOTES: A. C_L includes probe and jig capacitance.
 B. The outputs are measured one at a time with one transition per measurement.
 C. Input rise and fall times are 3 ns, $150 \text{ ns} < \text{pulse duration} < 10 \text{ } \mu\text{s}$ for both low-to-high and high-to-low transitions.
 D. Slew rate is defined as 10% and 90% of the transition times.
 E. Rise and fall times, open drain, are $< 120 \text{ ns}$.
 F. Input rise and fall times are 3 ns.

Figure 1. Load Circuits and Voltage Waveforms

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
SN74ACT1284DBLE	OBSOLETE	SSOP	DB	20		TBD	Call TI	Call TI
SN74ACT1284DBR	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ACT1284DBRE4	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ACT1284DBRG4	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ACT1284DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ACT1284DWE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ACT1284DWG4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ACT1284DWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ACT1284DWRE4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ACT1284DWRG4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ACT1284NSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ACT1284NSRE4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ACT1284NSRG4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ACT1284PW	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ACT1284PWE4	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ACT1284PWG4	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ACT1284PWR	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ACT1284PWRE4	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ACT1284PWRG4	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

⁽¹⁾ The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

⁽²⁾ Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

Important Information and Disclaimer:The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

TAPE AND REEL INFORMATION



QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74ACT1284DBR	SSOP	DB	20	2000	330.0	16.4	8.2	7.5	2.5	12.0	16.0	Q1
SN74ACT1284DWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.0	2.7	12.0	24.0	Q1
SN74ACT1284NSR	SO	NS	20	2000	330.0	24.4	8.2	13.0	2.5	12.0	24.0	Q1
SN74ACT1284PWR	TSSOP	PW	20	2000	330.0	16.4	6.95	7.1	1.6	8.0	16.0	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74ACT1284DBR	SSOP	DB	20	2000	346.0	346.0	33.0
SN74ACT1284DWR	SOIC	DW	20	2000	346.0	346.0	41.0
SN74ACT1284NSR	SO	NS	20	2000	346.0	346.0	41.0
SN74ACT1284PWR	TSSOP	PW	20	2000	346.0	346.0	33.0

DB (R-PDSO-G**)

PLASTIC SMALL-OUTLINE

28 PINS SHOWN



- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.
 D. Falls within JEDEC MO-150

MECHANICAL DATA

NS (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

PW (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14 PINS SHOWN



4040064/F 01/97

- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.
 D. Falls within JEDEC MO-153

DW (R-PDSO-G20)

PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
 - D. Falls within JEDEC MS-013 variation AC.

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

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

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products

Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DSP	dsp.ti.com
Clocks and Timers	www.ti.com/clocks
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
RF/IF and ZigBee® Solutions	www.ti.com/lprf

Applications

Audio	www.ti.com/audio
Automotive	www.ti.com/automotive
Broadband	www.ti.com/broadband
Digital Control	www.ti.com/digitalcontrol
Medical	www.ti.com/medical
Military	www.ti.com/military
Optical Networking	www.ti.com/opticalnetwork
Security	www.ti.com/security
Telephony	www.ti.com/telephony
Video & Imaging	www.ti.com/video
Wireless	www.ti.com/wireless

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2008, Texas Instruments Incorporated