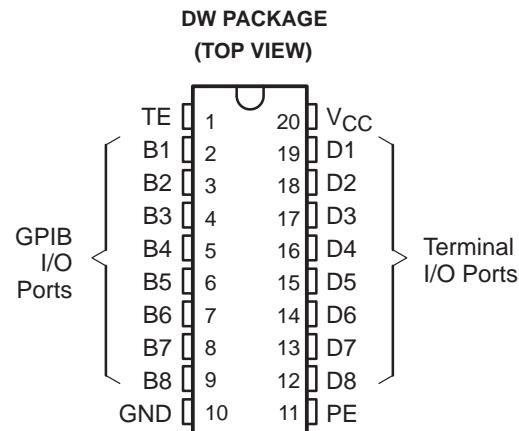


- 8-Channel Bidirectional Transceiver
- High-Speed Advanced Low-Power Schottky Circuitry
- Low Power Dissipation . . . 46 mW Max per Channel
- Fast Propagation Times . . . 20 ns Max
- High-Impedance pnp Inputs
- Receiver Hysteresis . . . 650 mV Typ
- Open-Collector Driver Output Option
- No Loading of Bus When Device Is Powered Down ($V_{CC} = 0$)
- Power-Up/Power-Down Protection (Glitch Free)



NOT RECOMMENDED FOR NEW DESIGNS

description

The SN75ALS163 octal general-purpose interface bus transceiver is a monolithic, high-speed, advanced low-power Schottky device. It is designed for two-way data communications over single-ended transmission lines. The transceiver features driver outputs that can be operated in either the open-collector or 3-state mode. If talk enable (TE) is high, these outputs have the characteristics of open-collector outputs when pullup enable (PE) is low and of 3-state outputs when PE is high. Taking TE low places the outputs in the high-impedance state. The driver outputs are designed to handle loads of up to 48 mA of sink current. Each receiver features pnp transistor inputs for high input impedance and 400 mV minimum of hysteresis for increased noise immunity.

Output glitches during power up and power down are eliminated by an internal circuit that disables both the bus and receiver outputs. The outputs do not load the bus when $V_{CC} = 0$.

The SN75ALS163 is characterized for operation from 0°C to 70°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.

SN75ALS163

OCTAL GENERAL-PURPOSE INTERFACE BUS TRANSCEIVER

SLLS021E – JUNE 1986 – REVISED MAY 1998

Function Tables

EACH DRIVER

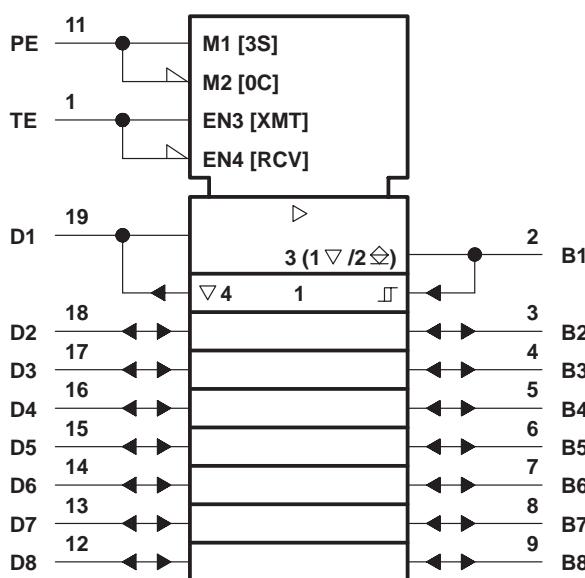
INPUTS			OUTPUT
D	TE	PE	B
H	H	H	H
L	H	X	L
H	X	L	Z
X	L	X	Z

EACH RECEIVER

INPUTS			OUTPUT
B	TE	PE	D
L	L	X	L
H	L	X	H
X	H	X	Z

H = high level, L = low level,
X = irrelevant, Z = high-impedance state

logic symbol[†]

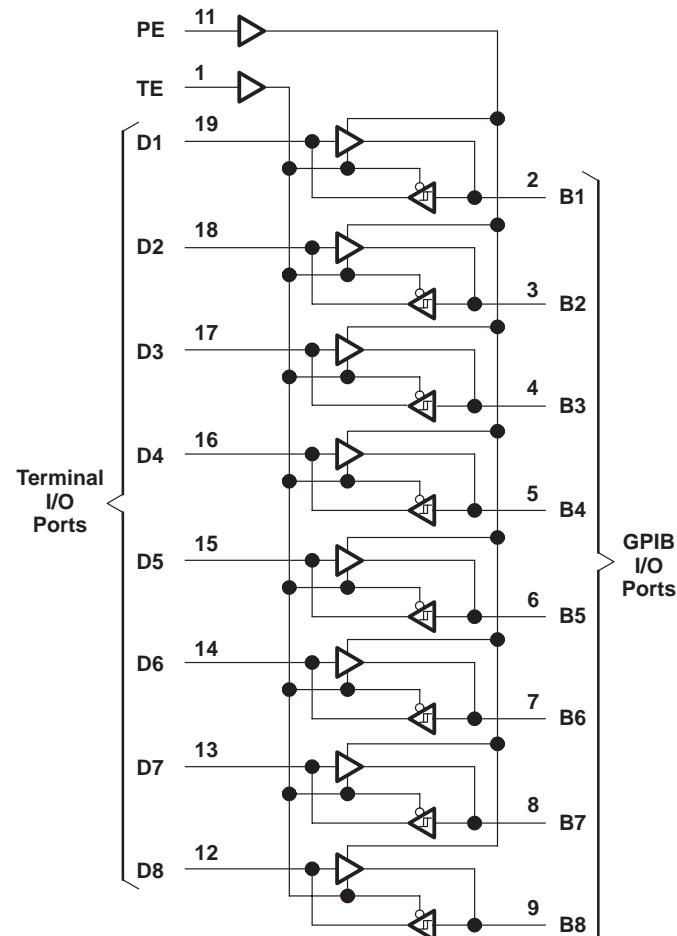


[†] This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

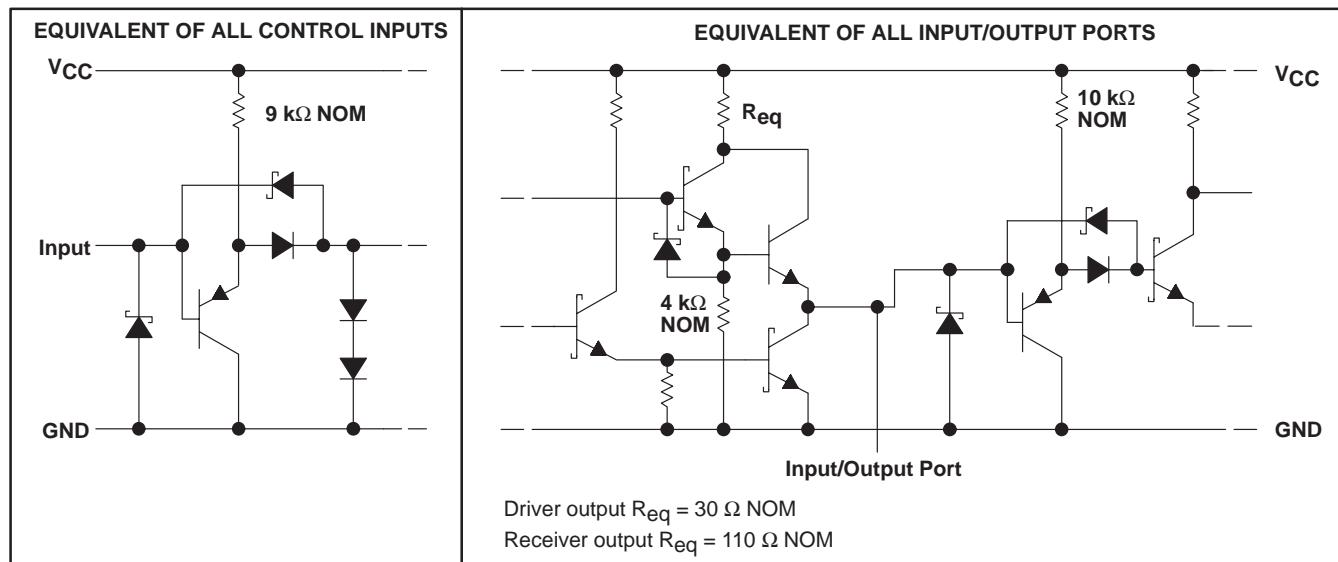
▽ Designates 3-state outputs

△ Designates open-collector outputs

logic diagram (positive logic)



schematics of inputs and outputs



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

Supply voltage, V _{CC} (see Note 1)	7 V
Input voltage, V _I	5.5 V
Low-level driver output current	100 mA
Package thermal impedance, θ_{JA} (see Note 2)	97°C/W
Storage temperature range, T _{stg}	–65°C to 150°C
Lead temperature 1.6 mm (1/16 inch) from the case for 10 seconds	260°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. All voltage values are with respect to network ground terminal.
2. The package thermal impedance is calculated in accordance with JESD 51.

recommended operating conditions

	MIN	NOM	MAX	UNIT
Supply voltage, V _{CC}	4.75	5	5.25	V
High-level input voltage, V _{IH}		2		V
Low-level input voltage, V _{IL}			0.8	V
High-level output current, I _{OH}	Bus ports with pullups active			–5.2 mA
	Terminal ports			–800 μA
Low-level output current, I _{OL}	Bus ports			48 mA
	Terminal ports			16 mA
Operating free-air temperature, T _A	0		70	°C

SN75ALS163

OCTAL GENERAL-PURPOSE INTERFACE BUS TRANSCEIVER

SLLS021E – JUNE 1986 – REVISED MAY 1998

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

PARAMETER		TEST CONDITIONS		MIN	TYP†	MAX	UNIT
V_{IK}	Input clamp voltage	$ I = -18 \text{ mA}$		-0.8		-1.5	V
V_{hys}	Hysteresis ($V_{T+} - V_{T-}$)	Bus		0.4		0.65	V
V_{OH}	High-level output voltage	Terminal	$I_{OH} = -800 \mu\text{A}$, TE at 0.8 V		2.7		3.5
		Bus	$I_{OH} = -5.2 \text{ mA}$, PE and TE at 2 V		2.5		3.3
V_{OL}	Low-level output voltage	Terminal	$I_{OL} = 16 \text{ mA}$, TE at 0.8 V		0.3		0.5
		Bus	$I_{OL} = 48 \text{ mA}$, TE at 2 V		0.35		0.5
I_{OH}	High-level output current (open-collector mode)	Bus	$V_O = 5.5 \text{ V}$, PE at 0.8 V, D and TE at 2 V		100		μA
I_{OZ}	Off-state output current (3-state mode)	Bus	PE at 2 V, TE at 0.8 V		20		μA
			$V_O = 0.5 \text{ V}$		-100		
I_I	Input current at maximum input voltage	Terminal	$V_I = 5.5 \text{ V}$		0.2		μA
I_{IH}	High-level input current	Terminal, PE, or TE	$V_I = 2.7 \text{ V}$		0.1		μA
I_{IL}	Low-level input current	Terminal, PE, or TE	$V_I = 0.5 \text{ V}$		-10		μA
I_{OS}	Short-circuit output current	Terminal			-15		-35
		Bus			-25		-125
I_{CC}	Supply current	No load	Terminal outputs low and enabled		42		mA
			Bus outputs low and enabled		52		
$C_{I/O(\text{bus})}$	Bus-port capacitance	$V_{CC} = 0 \text{ to } 5 \text{ V}$, $V_{I/O} = 0 \text{ to } 2 \text{ V}$, $f = 1 \text{ MHz}$		30		pF	

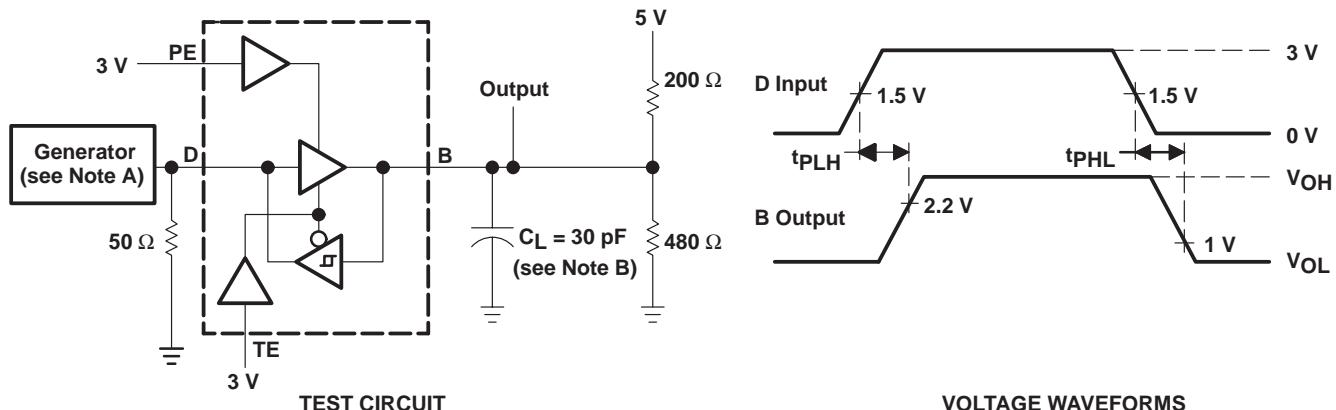
† All typical values are at $V_{CC} = 5 \text{ V}$, $T_A = 25^\circ\text{C}$.

switching characteristics over recommended operating free-air temperature range (unless otherwise noted), $V_{CC} = 5 \text{ V}$

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP†	MAX	UNIT		
t_{PLH}	Propagation delay time, low-to-high-level output	Terminal	$C_L = 30 \text{ pF}$, See Figure 1	7		20	ns		
t_{PHL}				8		20			
t_{PLH}	Propagation delay time, low-to-high-level output	Bus	$C_L = 30 \text{ pF}$, See Figure 2	7		14	ns		
t_{PHL}				9		14			
t_{PZH}	Output enable time to high level		$C_L = 15 \text{ pF}$, See Figure 3	19		30	ns		
t_{PHZ}	Output disable time from high level			5		12			
t_{PZL}	Output enable time to low level			16		35			
t_{PLZ}	Output disable time from low level			9		20			
t_{PZH}	Output enable time to high level		$C_L = 15 \text{ pF}$, See Figure 4	13		30	ns		
t_{PHZ}	Output disable time from high level			12		20			
t_{PZL}	Output enable time to low level			12		20			
t_{PLZ}	Output disable time from low level			11		20			
t_{en}	Output pull-up enable time		$C_L = 15 \text{ pF}$, See Figure 5	11		22	ns		
t_{dis}	Output pull-up disable time			6		12			

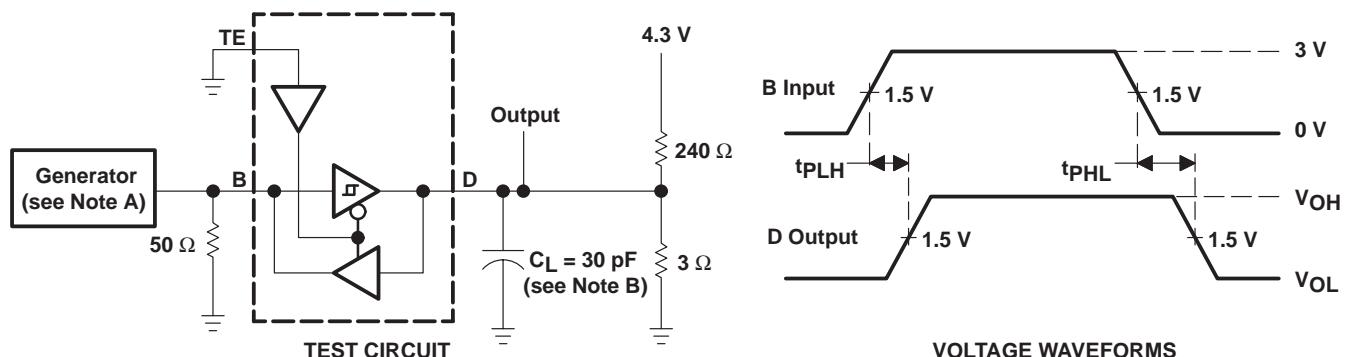
† All typical values are at $V_{CC} = 5 \text{ V}$, $T_A = 25^\circ\text{C}$.

PARAMETER MEASUREMENT INFORMATION



NOTES: A. The input pulse is supplied by a generator having the following characteristics: PRR \leq 1 MHz, 50% duty cycle, $t_r \leq 6$ ns, $t_f \leq 6$ ns, $Z_O = 50 \Omega$.
B. C_L includes probe and jig capacitance.

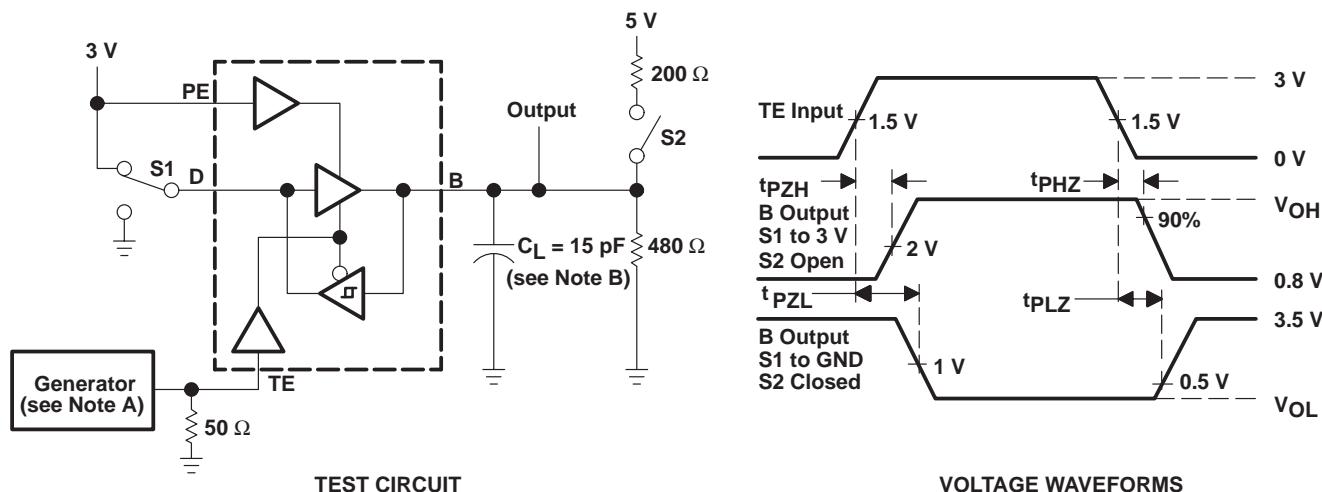
Figure 1. Terminal-to-Bus Test Circuit and Voltage Waveforms



NOTES: A. The input pulse is supplied by a generator having the following characteristics: PRR \leq 1 MHz, 50% duty cycle, $t_r \leq 6$ ns, $t_f \leq 6$ ns, $Z_O = 50 \Omega$.
B. C_L includes probe and jig capacitance.

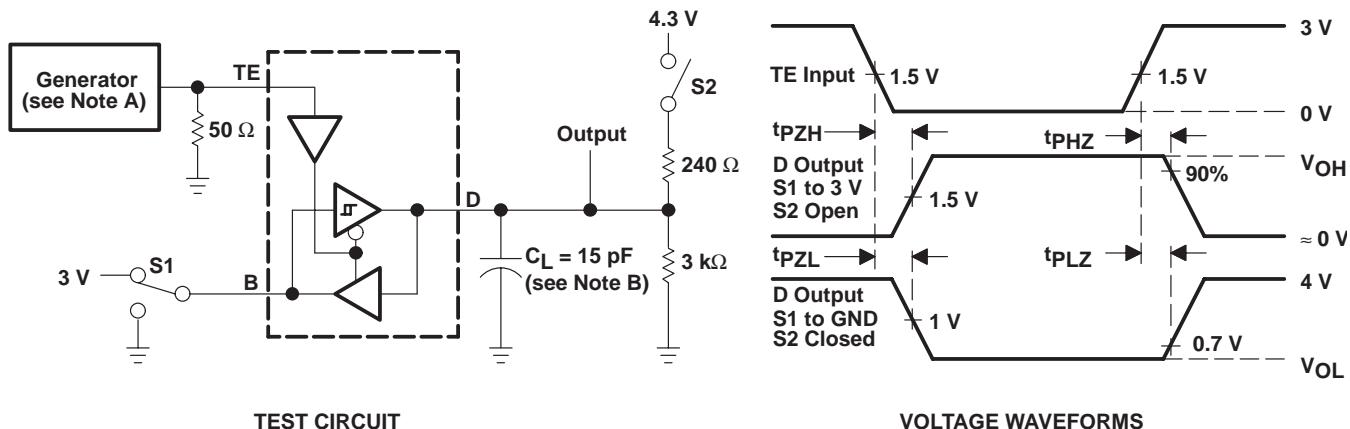
Figure 2. Bus-to-Terminal Test Circuit and Voltage Waveforms

PARAMETER MEASUREMENT INFORMATION



NOTES: A. The input pulse is supplied by a generator having the following characteristics: PRR \leq 1 MHz, 50% duty cycle, $t_r \leq 6$ ns, $t_f \leq 6$ ns, $Z_O = 50 \Omega$.
 B. C_L includes probe and jig capacitance.

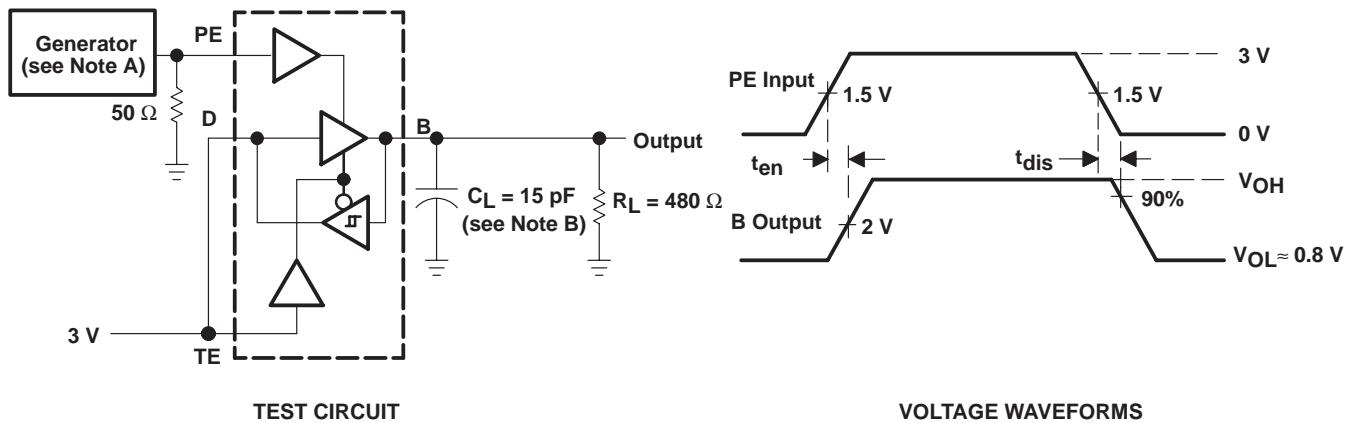
Figure 3. TE-to-Bus Test Circuit and Voltage Waveforms



NOTES: A. The input pulse is supplied by a generator having the following characteristics: PRR \leq 1 MHz, 50% duty cycle, $t_r \leq 6$ ns, $t_f \leq 6$ ns, $Z_O = 50 \Omega$.
 B. C_L includes probe and jig capacitance.

Figure 4. TE-to-Terminal Test Circuit and Voltage Waveforms

PARAMETER MEASUREMENT INFORMATION



NOTES: A. The input pulse is supplied by a generator having the following characteristics: PRR \leq 1 MHz, 50% duty cycle, $t_r \leq 6$ ns, $t_f \leq 6$ ns, $Z_O = 50 \Omega$.
 B. C_L includes probe and jig capacitance.

Figure 5. PE-to-Bus Test Circuit and Voltage Waveforms

TYPICAL CHARACTERISTICS

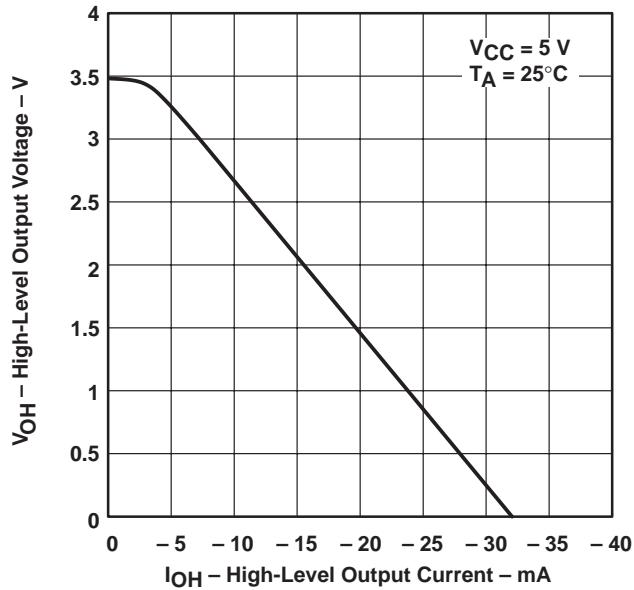
TERMINAL HIGH-LEVEL OUTPUT VOLTAGE
vs
HIGH-LEVEL OUTPUT CURRENT

Figure 6

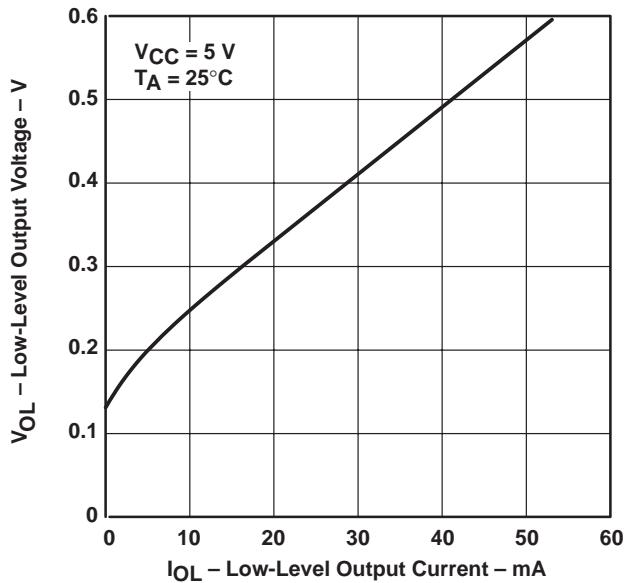
TERMINAL LOW-LEVEL OUTPUT VOLTAGE
vs
LOW-LEVEL OUTPUT CURRENT

Figure 7

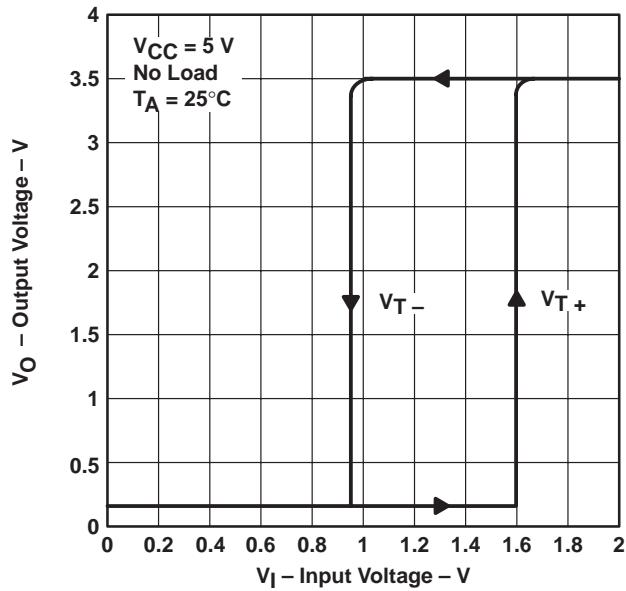
TERMINAL OUTPUT VOLTAGE
vs
BUS INPUT VOLTAGE

Figure 8

TYPICAL CHARACTERISTICS

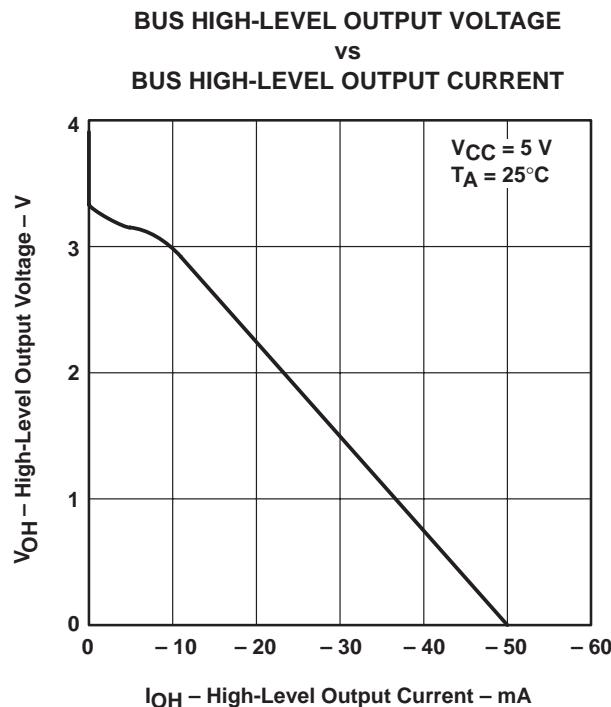


Figure 9

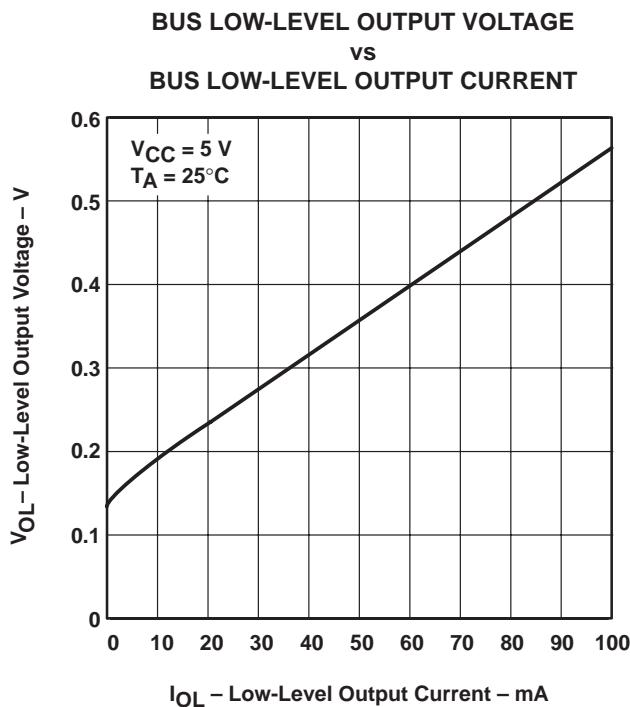


Figure 10

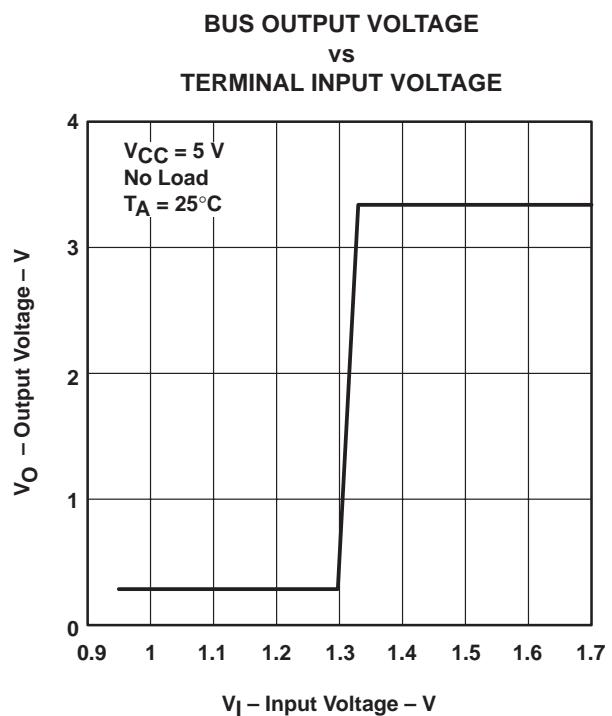


Figure 11

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
SN75ALS163DWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75ALS163DWRE4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75ALS163DWRG4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75ALS163N	OBsolete	PDIP	N	20		TBD	Call TI	Call TI

⁽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.

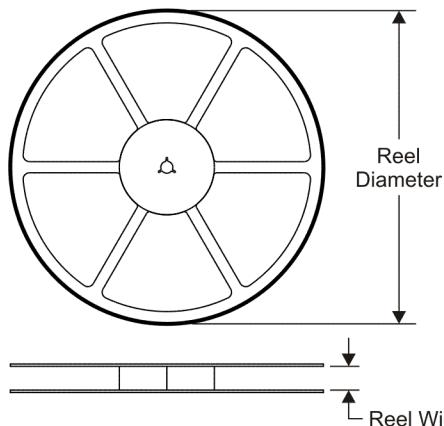
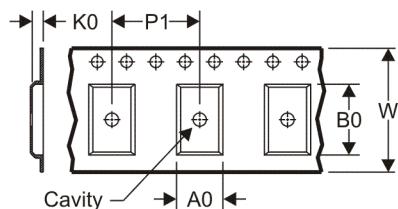
Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

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)

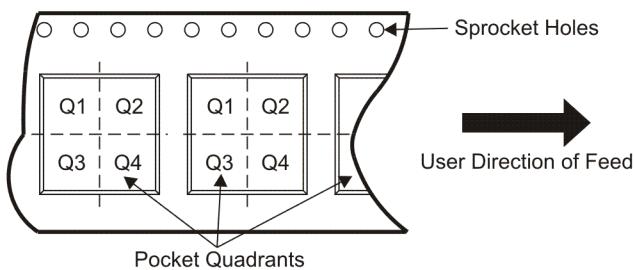
⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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
REEL DIMENSIONS

TAPE DIMENSIONS


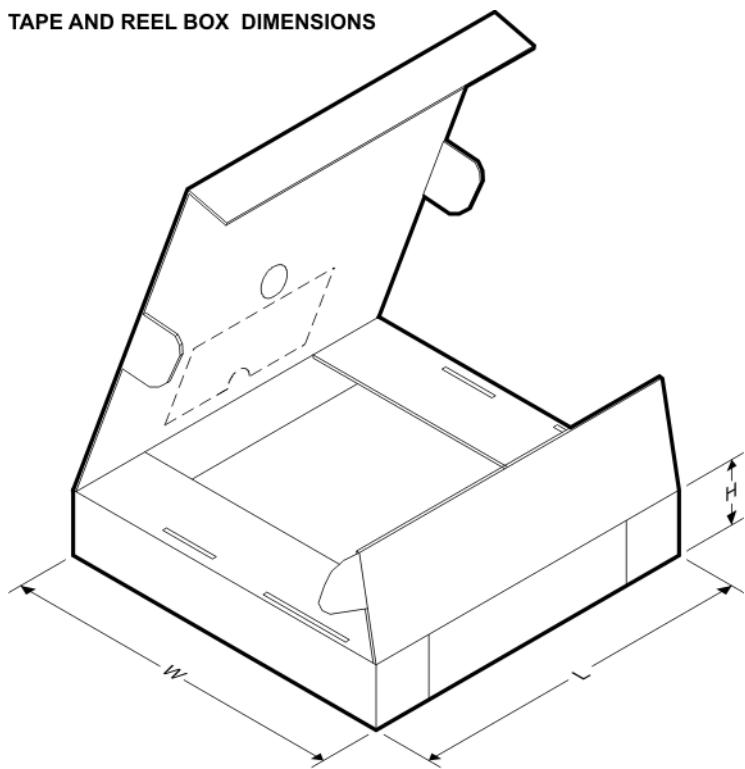
A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

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
SN75ALS163DWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.1	2.65	12.0	24.0	Q1

TAPE AND REEL BOX DIMENSIONS

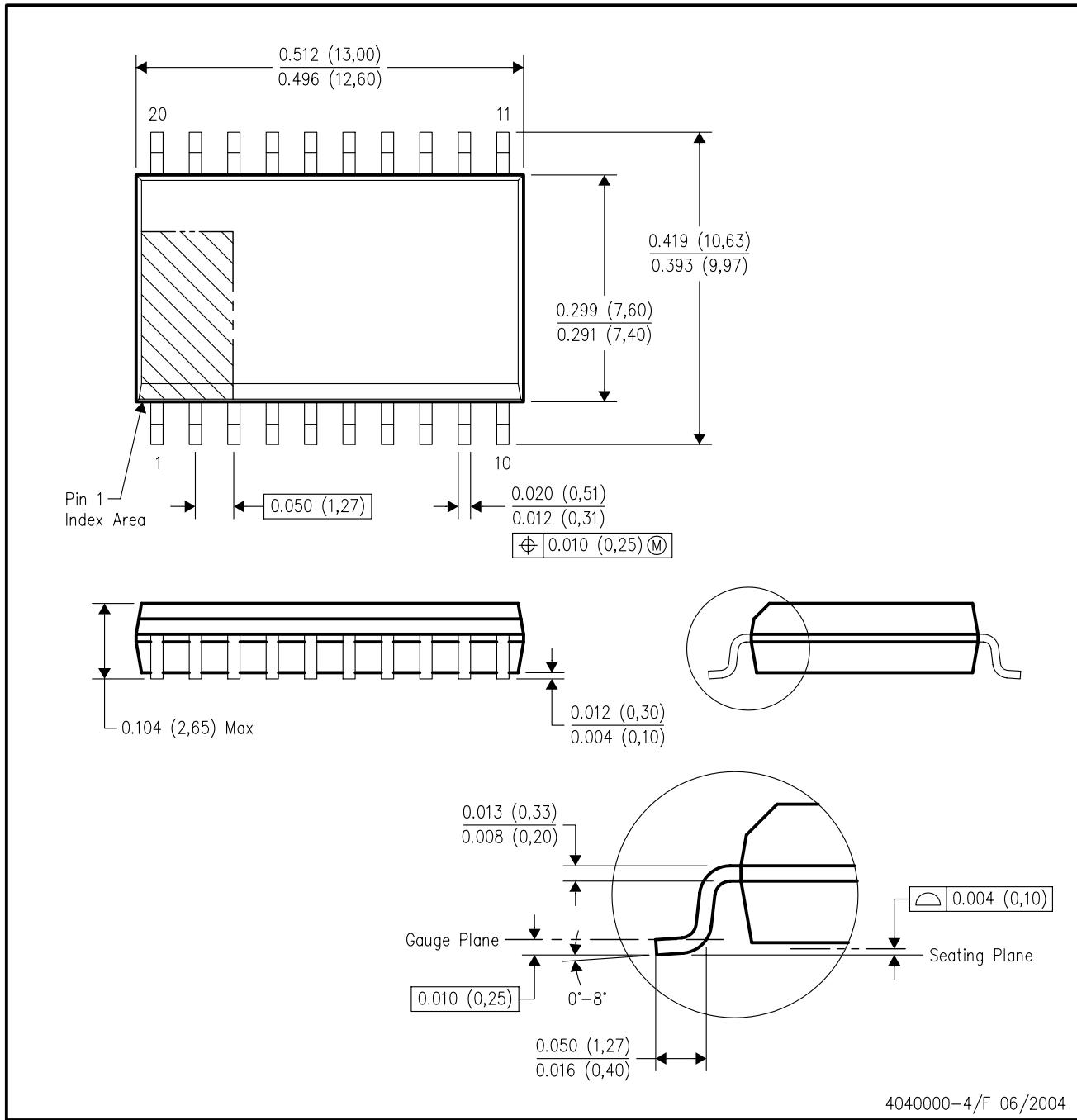


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN75ALS163DWR	SOIC	DW	20	2000	346.0	346.0	41.0

DW (R-PDSO-G20)

PLASTIC SMALL-OUTLINE PACKAGE



NOTES:

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

N (R-PDIP-T**)

16 PINS SHOWN

PLASTIC DUAL-IN-LINE PACKAGE



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
DLP® Products	www.dlp.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 © 2009, Texas Instruments Incorporated