

# Octal Line Receiver

## FEATURES

- Meets EIA232E/423A/422A and CCITT V.10, V.11, V.28, X.26, X.27
- Single +5V Supply—TTL Compatible Outputs
- Differential Inputs withstand  $\pm 25V$
- Low Open Circuit Voltage for Improved Failsafe Characteristic
- Reduced Supply Current—35mA Max
- Internal Hysteresis

## DESCRIPTION

The UC5181C is an octal line receiver designed to meet a wide range of digital communications requirements as outlined in EIA standards EIA232E, EIA422A, EIA423A and CCITT V.10, V.11, V.28, X.26, and X.27. The UC5181C is similar to the UC5180C, but without the input filtering. Thus, it covers the entire range of data rates up to 10MBPS. A failsafe function allows these devices to "fail" to a known state under a wide variety of fault conditions at the inputs.

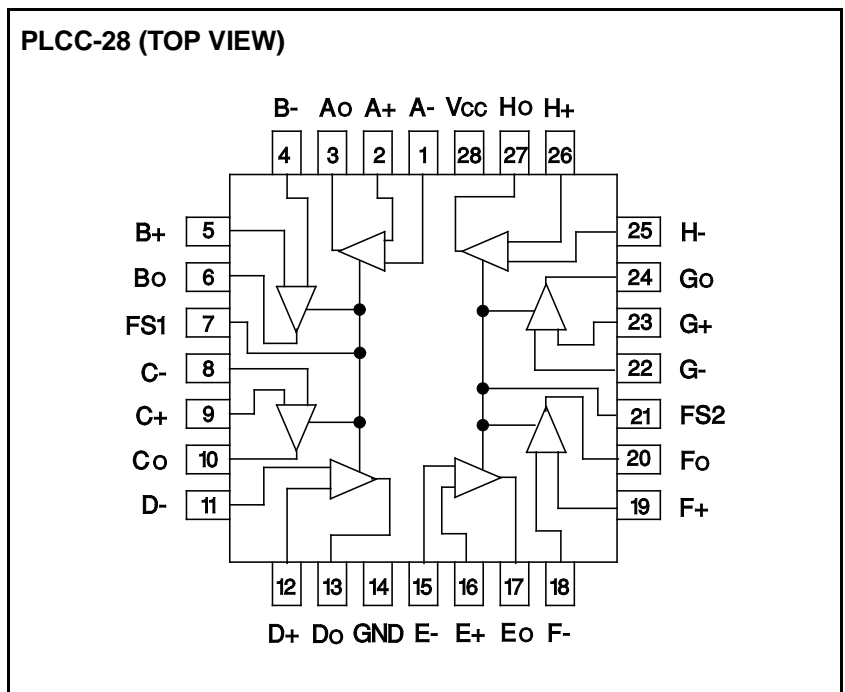
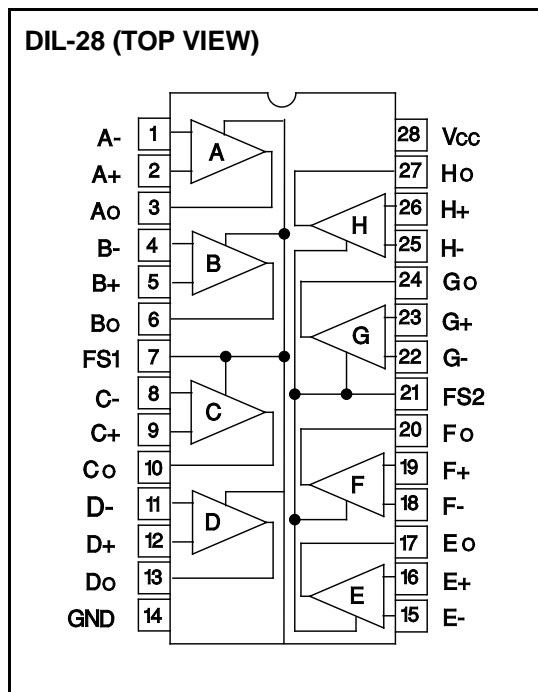
## ABSOLUTE MAXIMUM RATINGS (Note 1)

Supply Voltage, $V_{CC}$ .....	7V
Output Sink Current .....	50mA
Output Short Circuit Time .....	1 Sec
Common Mode Input Range .....	15V
Differential Input Range .....	25V
Failsafe Voltage .....	-0.3 to $V_{CC}$
PLCC Power Dissipation, $T_A=25^\circ C$ (Note 2) .....	1000 mW
DIP Power Dissipation, $T_A=25^\circ C$ (Note 2) .....	1200 mW
Storage Temperature Range .....	$-65^\circ C$ to $+150^\circ C$
Lead Temperature (Soldering, 10 seconds) .....	$-300^\circ C$

*Note 1: All voltages are with respect to ground, pin 14. Currents are positive in, negative out of the specified terminal.*

*Note 2: Consult packaging section of Databook for thermal limitations and considerations of package.*

## CONNECTION DIAGRAMS



**DC ELECTRICAL CHARACTERISTICS:** Unless otherwise stated, these specifications apply for  $T_A = 0^\circ\text{C}$  to  $+70^\circ\text{C}$ ;  $V_{CC} = 5\text{V} \pm 5\%$ , Input Common Mode Range  $\pm 7\text{V}$ ,  $T_A = T_J$ .

PARAMETER	SYMBOL	TEST CONDITIONS	UC5181C		UNITS	
			MIN	MAX		
DC Input Resistance	$R_{IN}$	$3\text{V} \leq  V_{IN}  \leq 25\text{V}$	3	7	$\text{k}\Omega$	
Failsafe Output Voltage	$V_{OFS}$	Inputs Open or Shorted Together, or One Input Open and One Grounded	$0 \geq I_{OUT} \leq 8\text{mA}$ , $V_{FAILSAFE} = 0\text{V}$	0.45	V	
			$0 \geq I_{OUT} \geq -400\mu\text{A}$ , $V_{FAILSAFE} = V_{CC}$	2.7		
Differential Input High Threshold	$V_{TL}$	$V_{OUT} = 0.45\text{V}$ , $I_{OUT} = -440\mu\text{A}$ (See Figure 1)	$R_s = 0$ (Note 3)	50	200	mV
			$R_s = 500$ (Note 3)		400	
Differential Input Low Threshold	$V_{TL}$	$V_{OUT} = 0.45\text{V}$ , $I_{OUT} = 8\text{mA}$ (See Figure 1)	$R_s = 0$ (Note 3)	-200	-50	mV
			$R_s = 500$ (Note 3)		-400	
Hysteresis	$V_H$	$F_s = 0\text{V}$ or $V_{CC}$ (See Figure 1)	45	140	mV	
Open Circuit Input Voltage	$V_{IOC}$			75	mV	
Input Capacitance	$C_i$			20	pF	
High Level Output Voltage	$V_{OH}$	$V_{ID} = 1\text{V}$ , $I_{OUT} = -440\mu\text{A}$	2.7		V	
Low Level Output Voltage	$V_{OL}$	$V_{ID} = -1\text{V}$ (Note 4)	$I_{OUT} = 4\text{mA}$	0.4	V	
			$I_{OUT} = 8\text{mA}$	0.45		
Short Circuit Output Current	$I_{OS}$	Note 5	20	100	mA	
Supply current	$I_{CC}$	$4.75\text{V} \leq V_{CC} \leq 5.25\text{V}$		35	mA	
Input Current	$I_{IN}$	Other Inputs Grounded	$V_{IN} = +10\text{V}$	3.25	mA	
			$V_{IN} = -10\text{V}$	-3.25		

Note 3:  $R_s$  is a resistor in series with each input.

Note 4: Measure after 100 ms warm up (at  $0^\circ\text{C}$ ).

Note 5: Only 1 output may be shorted at a time and then only for a maximum of 1 sec.

Note 6: The delays, either  $t_{PLH}$  or  $t_{PHL}$ , shall not vary from receiver to receiver by more than 35ns.

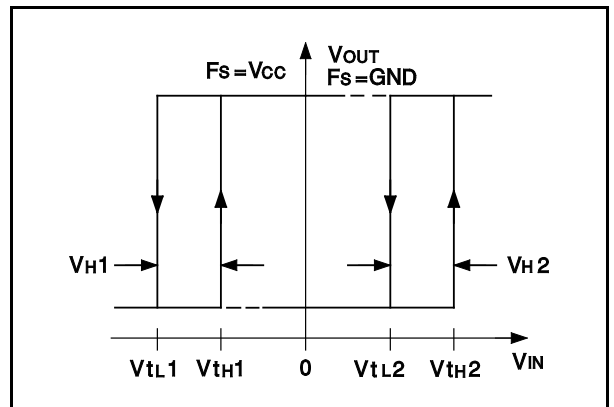


Figure 1. VTL, VTH, VH Definition

**AC ELECTRICAL CHARACTERISTICS:**  $V_{CC} = 5\text{V} \pm 5\%$ .  $T_A = 0^\circ\text{C}$  to  $+70^\circ\text{C}$ , Figure 2  $T_A = T_J$ .

PARAMETER	SYMBOL	TEST CONDITIONS	UC5181C		UNITS
			MIN	MAX	
Propagation Delay–Low to High	$t_{PLH}$	$C_L = 50\text{pF}$ , $V_{IN} = \pm 500\text{mV}$ (Note 6)		120	ns
Propagation Delay–High to Low	$t_{PHL}$	$C_L = 50\text{pF}$ , $V_{IN} = \pm 500\text{mV}$ (Note 6)		120	ns
Acceptable Input frequency	$f_A$	Unused Input Grounded, $V_{IN} = \pm 200\text{mV}$		5.0	MHz

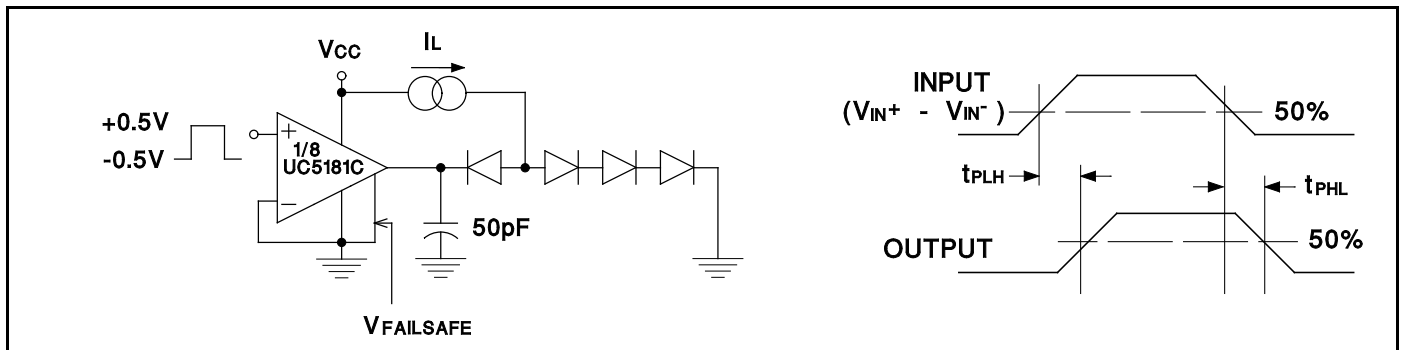


Figure 2. AC Test Circuit

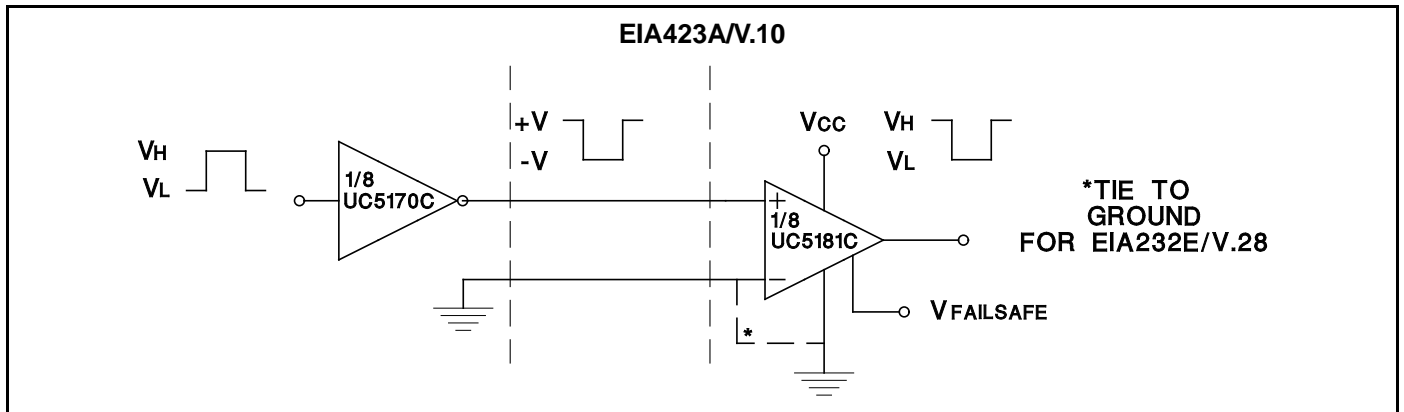
**APPLICATIONS INFORMATION**

**Failsafe Operation**

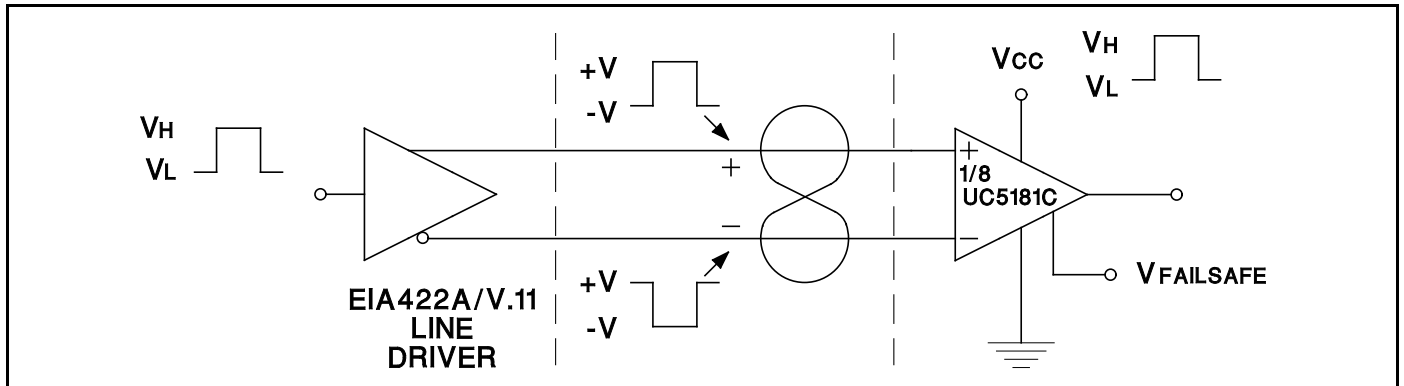
These devices provide a failsafe operating mode to guard against input fault conditions as defined in EIA422A and EIA423A standards. These fault conditions are (1) driver in power-off condition, (2) receiver not interconnected with driver, (3) open-circuited interconnecting cable, and (4) short-circuited interconnecting cable. If one of these four fault conditions occurs at the inputs of a receiver,

then the output of that receiver is driven to a known logic level. The receiver is programmed by connecting the failsafe input to VCC or ground. A connection to VCC provides a logic "1" output under fault conditions, while a connection to ground provides a logic "0". There are two failsafe pins (Fs1 and Fs2) on the UC5181C where each provides common failsafe control for four receivers.

**EIA232E/V.28 / EIA423A/V.10 DATA TRANSMISSION**



**EIA422A/V.11 DATA TRANSMISSION**



**GENERAL LAYOUT NOTES**

The drivers and receivers should be mounted close to the system common ground point, with the ground reference tied to the common point to reduce RFI/EMI.

Filter connectors or transzorbs should be used to reduce the RFI/EMI, and protecting the system from static (ESD), and electrical overstress (EOS). A filter connector or capacitor will reduce the ESD pulse by 90% typically. A cable dragged across a carpet and connected to a system can easily be charged to over 25,000 volts. This is a metal to metal contact when the cable is connected to the

system (no resistance), currents exceed 80 amps with less than a nanosecond rise time. A transzorb provides two functions, the device capacitance inherently acts as a filter capacitor, and the device clamps the ESD and EOS pulses which would pass through the capacitor and destroy the devices. The recommended transzorb for the UC5180C and the UC5181C is P6KE22CA.

\* Transzorb is a trademark of General Semiconductor Industries.

**PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
UC5181CQ	ACTIVE	PLCC	FN	28	37	TBD	CU NIPDAU	Level-2-220C-1 YEAR
UC5181CQTR	ACTIVE	PLCC	FN	28	750	TBD	CU NIPDAU	Level-2-220C-1 YEAR

<sup>(1)</sup> 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.

<sup>(2)</sup> 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.

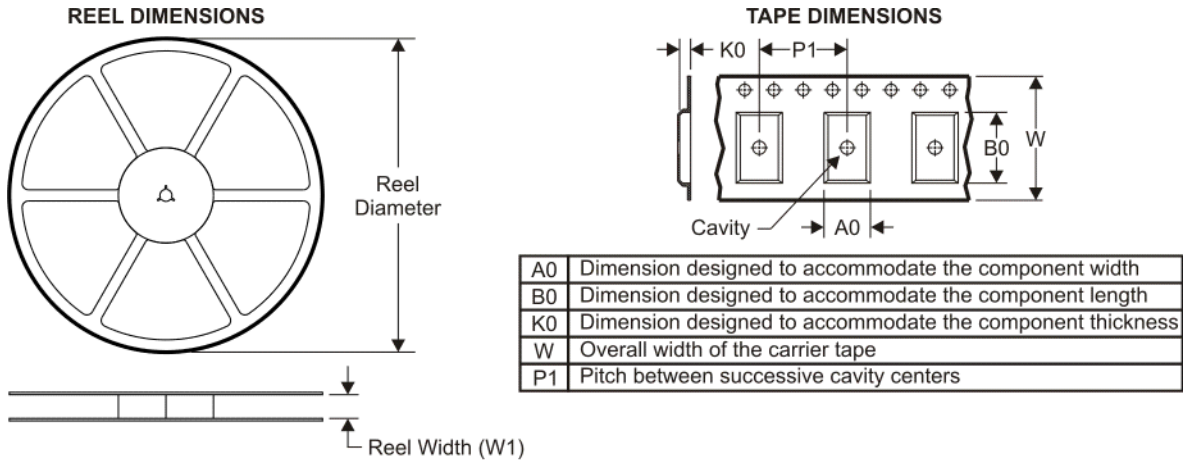
**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

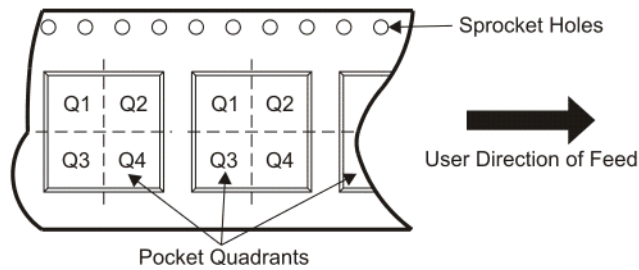
**Important Information and Disclaimer:**The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. 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
UC5181CQTR	PLCC	FN	28	750	330.0	24.4	12.95	12.95	5.0	16.0	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)
UC5181CQTR	PLCC	FN	28	750	346.0	346.0	41.0

## 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	<a href="http://amplifier.ti.com">amplifier.ti.com</a>
Data Converters	<a href="http://dataconverter.ti.com">dataconverter.ti.com</a>
DLP® Products	<a href="http://www.dlp.com">www.dlp.com</a>
DSP	<a href="http://dsp.ti.com">dsp.ti.com</a>
Clocks and Timers	<a href="http://www.ti.com/clocks">www.ti.com/clocks</a>
Interface	<a href="http://interface.ti.com">interface.ti.com</a>
Logic	<a href="http://logic.ti.com">logic.ti.com</a>
Power Mgmt	<a href="http://power.ti.com">power.ti.com</a>
Microcontrollers	<a href="http://microcontroller.ti.com">microcontroller.ti.com</a>
RFID	<a href="http://www.ti-rfid.com">www.ti-rfid.com</a>
RF/IF and ZigBee® Solutions	<a href="http://www.ti.com/lprf">www.ti.com/lprf</a>

### Applications

Audio	<a href="http://www.ti.com/audio">www.ti.com/audio</a>
Automotive	<a href="http://www.ti.com/automotive">www.ti.com/automotive</a>
Broadband	<a href="http://www.ti.com/broadband">www.ti.com/broadband</a>
Digital Control	<a href="http://www.ti.com/digitalcontrol">www.ti.com/digitalcontrol</a>
Medical	<a href="http://www.ti.com/medical">www.ti.com/medical</a>
Military	<a href="http://www.ti.com/military">www.ti.com/military</a>
Optical Networking	<a href="http://www.ti.com/opticalnetwork">www.ti.com/opticalnetwork</a>
Security	<a href="http://www.ti.com/security">www.ti.com/security</a>
Telephony	<a href="http://www.ti.com/telephony">www.ti.com/telephony</a>
Video & Imaging	<a href="http://www.ti.com/video">www.ti.com/video</a>
Wireless	<a href="http://www.ti.com/wireless">www.ti.com/wireless</a>

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265  
Copyright © 2009, Texas Instruments Incorporated