

# TIL917, TIL917A, TIL917B, TIL917C, TIL918, TIL918A TIL918B, TIL918C, TIL919, TIL919A, TIL919B, TIL919C SINGLE/DUAL/QUAD CHANNEL OPTOCOUPLEDERS/OPTOISOLATORS

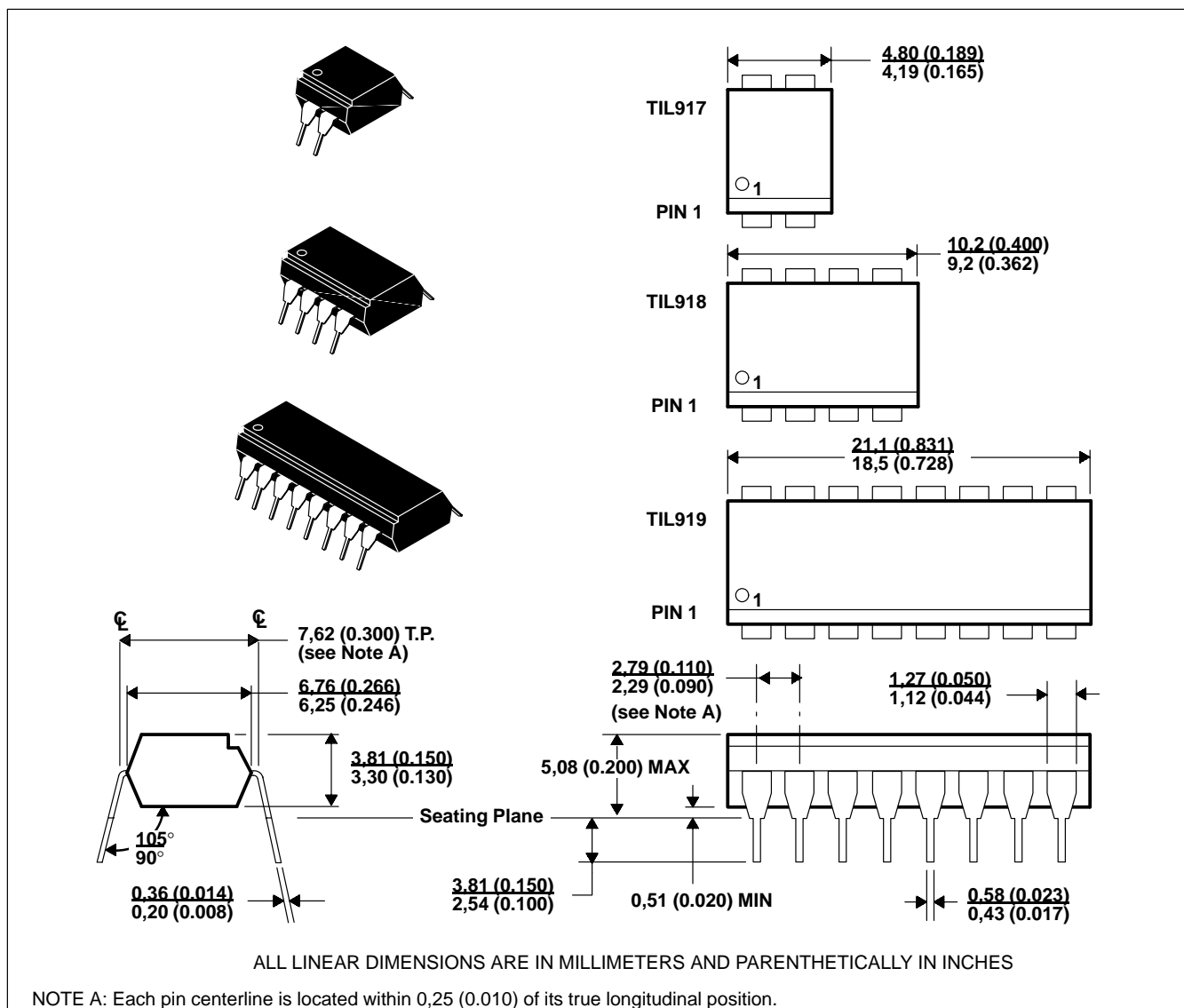
SOOS030 – FEBRUARY 1992

- Gallium-Arsenide Diode Infrared Source
- Source Is Optically Coupled to Silicon N-P-N Darlington Phototransistor
- Choice of One, Two or Four Channels
- Choice of Four Current-Transfer Ratios
- High-Voltage Electrical Isolation . . . 7.5 kV Peak (5.3 kV rms)
- Plastic Dual-In-Line Packages
- UL Listed – File No. E65085

## description

These optocouplers consist of a gallium-arsenide light-emitting diode and a silicon n-p-n Darlington phototransistor per channel. The TIL917 has one channel in a 4-pin package, the TIL918 has two channels in an 8-pin package, and the TIL919 has four channels in a 16-pin package. The standard devices, TIL917, TIL918, and TIL919, are tested for a current-transfer ratio of 20% minimum. Devices selected for a current-transfer ratio of 50%, 100%, and 200% minimum are designated with the suffix A, B, and C, respectively.

## mechanical data



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.



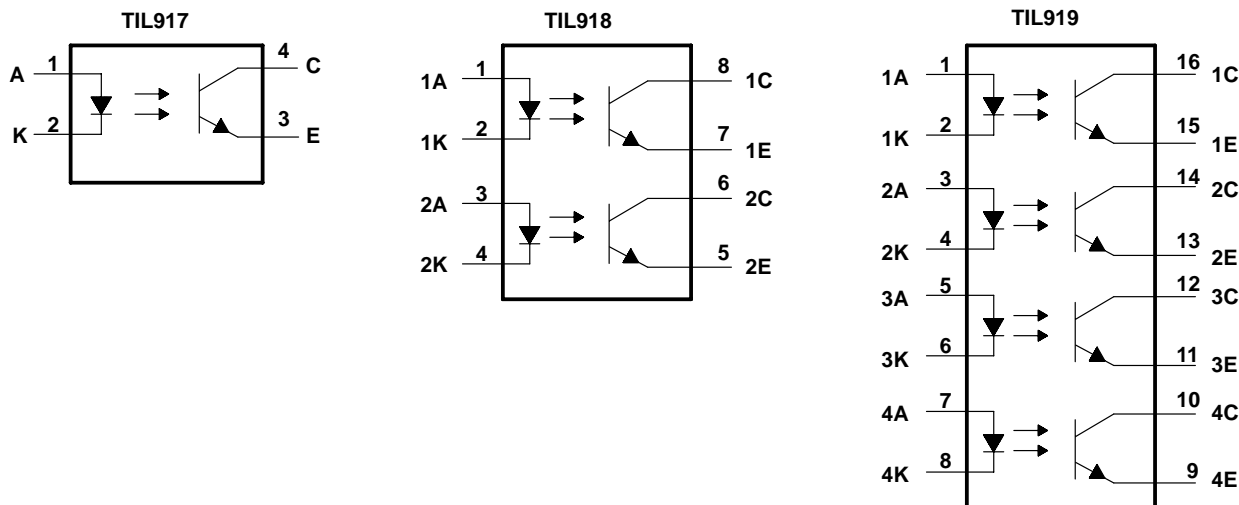
POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

Copyright © 1992, Texas Instruments Incorporated

**TIL917, TIL917A, TIL917B, TIL917C, TIL918, TIL918A  
TIL918B, TIL918C, TIL919, TIL919A, TIL919B, TIL919C  
SINGLE/DUAL/QUAD CHANNEL OPTOCOUPPLERS/OPTOISOLATORS**

SOOS030 – FEBRUARY 1992

**schematic diagrams**



**absolute maximum ratings, T<sub>A</sub> = 25°C (unless otherwise noted)**

Input-to-output voltage (see Note 1)	±7.5 kV peak or dc (±5.3 kV rms)
Collector-emitter voltage (see Note 2)	35 V
Emitter-collector voltage	7 V
Input diode reverse voltage	5 V
Input diode continuous forward current at (or below) 25°C free-air temperature (see Note 3)	50 mA
Continuous power dissipation at (or below) 25°C free-air temperature:	
Phototransistor (see Note 4)	150 mW
Input diode plus phototransistor per channel (see Note 5)	200 mW
Operating free-air temperature, T <sub>A</sub>	-55°C to 100°C
Storage temperature range	-55°C to 125°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260°C

- NOTES: 1. This rating applies for sine-wave operation at 50 or 60 Hz. Service capability is verified by testing in accordance with UL requirements.  
2. This value applies when the base-emitter diode is open circuited.  
3. Derate linearly to 100°C free-air temperature at the rate of 0.67 mA/°C.  
4. Derate linearly to 100°C free-air temperature at the rate of 2 mW/°C.  
5. Derate linearly to 100°C free-air temperature at the rate of 2.67 mW/°C.

**TIL917, TIL917A, TIL917B, TIL917C, TIL918, TIL918A  
TIL918B, TIL918C, TIL919, TIL919A, TIL919B, TIL919C  
SINGLE/DUAL/QUAD CHANNEL OPTOCOUPLEDERS/OPTOISOLATORS**

SOOS030 – FEBRUARY 1992

**electrical characteristics,  $T_A = 25^\circ\text{C}$  (unless otherwise noted)**

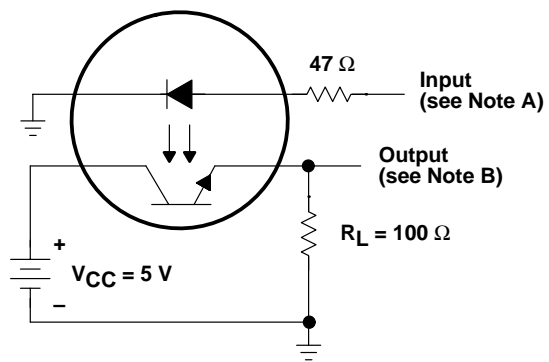
PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$V_{(BR)CEO}$	Collector-emitter breakdown voltage	$I_C = 0.5\text{ mA}$ , $I_F = 0$	35			V
$V_{(BR)ECO}$	Emitter-collector breakdown voltage	$I_C = 100\ \mu\text{A}$ , $I_F = 0$	7			V
$I_R$	Input diode static reverse current	$V_R = 5\text{ V}$			10	$\mu\text{A}$
$I_{C(off)}$	Off-state collector current	$V_{CE} = 24\text{ V}$ , $I_F = 0$			100	nA
CTR	Current transfer ratio	TIL917, TIL918, TIL919	$I_F = 5\text{ mA}$ , $V_{CE} = 5\text{ V}$	20%		
		TIL917A, TIL918A, TIL919A		50%		
		TIL917B, TIL918B, TIL919B		100%		
		TIL917C, TIL918C, TIL919C		200%	400%	
$V_F$	Input diode static forward voltage	$I_F = 20\text{ mA}$			1.4	V
$V_{CE(sat)}$	Collector-emitter saturation voltage	$I_F = 5\text{ mA}$ , $I_C = 1\text{ mA}$			0.4	V
$C_{iO}$	Input-to-output capacitance	$V_{in-out} = 0$ , $f = 1\text{ MHz}$ , See Note 6		1		pF
$r_{iO}$	Input-to-output internal resistance	$V_{in-out} = \pm 1\text{ kV}$ , See Note 6		$10^{11}$		$\Omega$

NOTE 6. These parameters are measured between all input-diode leads shorted together and all phototransistor leads shorted together.

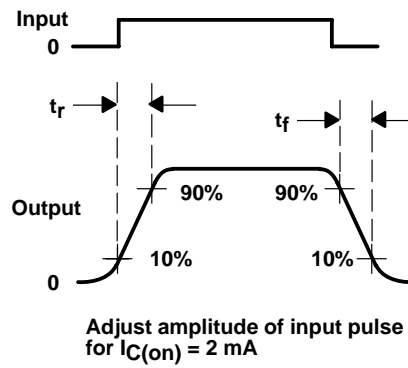
**switching characteristics,  $T_A = 25^\circ\text{C}$**

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_r$	Rise time	$V_{CC} = 5\text{ V}$ , $I_{C(on)} = 2\text{ mA}$ , $R_L = 100\ \Omega$ , See Figure 1		6		$\mu\text{s}$
$t_f$	Fall time			6		

**PARAMETER MEASUREMENT INFORMATION**



**TEST CIRCUIT**



Adjust amplitude of input pulse for  $I_{C(on)} = 2\text{ mA}$

**VOLTAGE WAVEFORMS**

- NOTES: A. The input waveform is supplied by a generator with the following characteristics:  $Z_0 = 50\ \Omega$ ,  $t_r \leq 15\text{ ns}$ , duty cycle = 1%,  $t_w = 500\ \mu\text{s}$ .  
B. The output waveform is monitored on an oscilloscope with the following characteristics:  $t_r \leq 12\text{ ns}$ ,  $R_{in} \geq 1\text{ M}\Omega$ ,  $C_{in} \leq 20\text{ pF}$ .

**Figure 1. Switching Times**

TYPICAL CHARACTERISTICS

FORWARD CURRENT  
 vs  
 FORWARD VOLTAGE

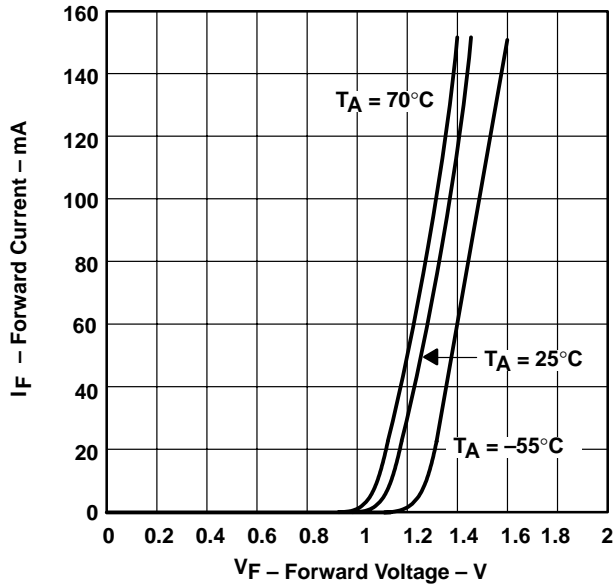


Figure 2

COLLECTOR CURRENT  
 vs  
 COLLECTOR-EMITTER VOLTAGE

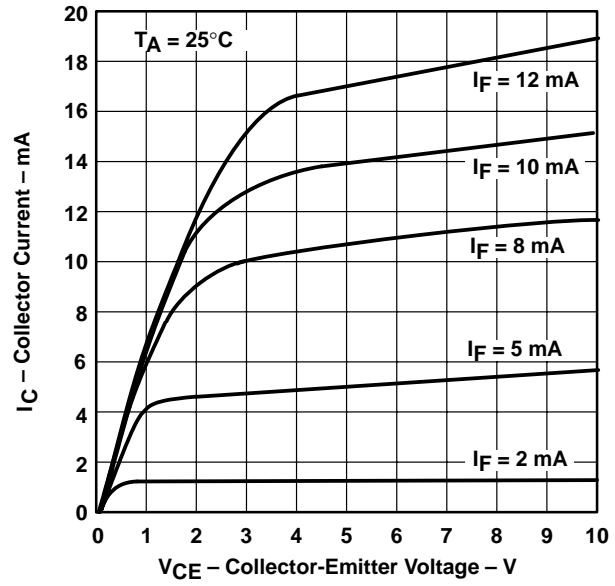


Figure 3

NORMALIZED ON-STATE COLLECTOR CURRENT  
 vs  
 INPUT-DIODE FORWARD CURRENT

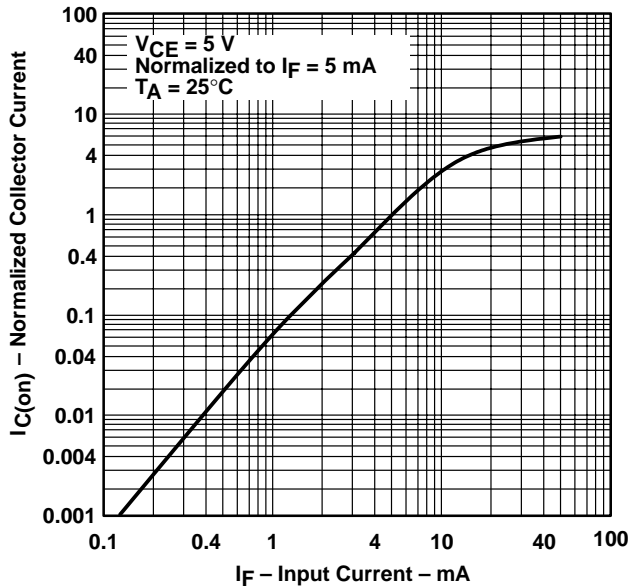


Figure 4

RELATIVE ON-STATE COLLECTOR CURRENT  
 vs  
 FREE-AIR TEMPERATURE

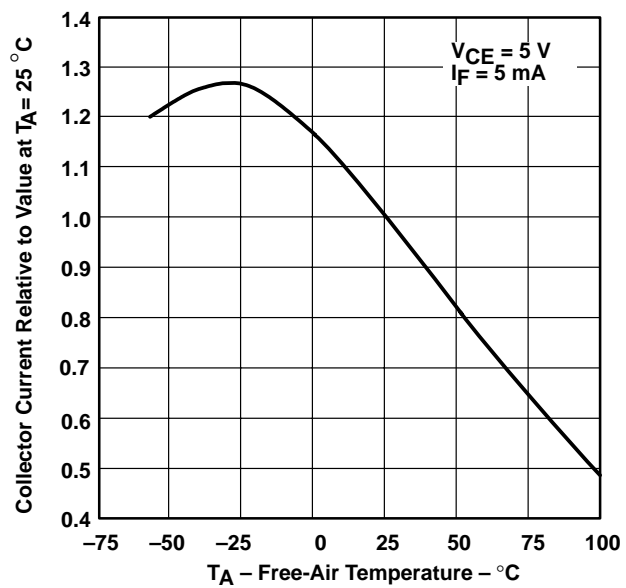


Figure 5

TYPICAL CHARACTERISTICS

TYPICAL COLLECTOR-EMITTER SATURATION VOLTAGE  
 vs  
 FREE-AIR TEMPERATURE

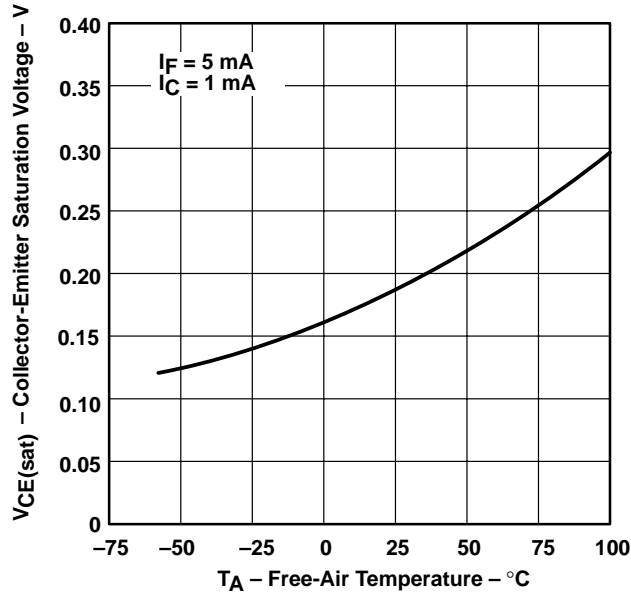


Figure 6

APPLICATION INFORMATION

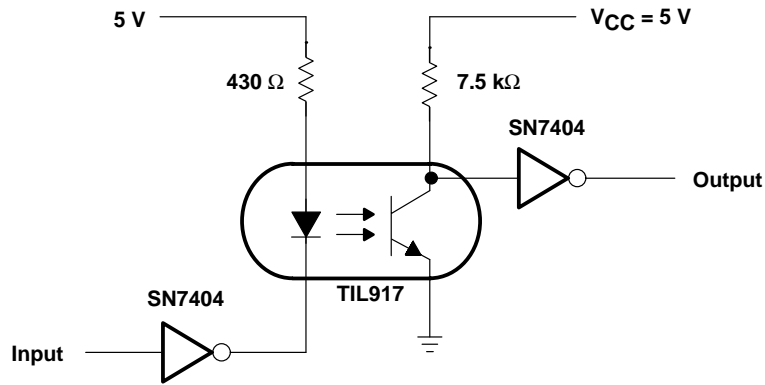


Figure 7. Data Transmission Circuit

**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>
TIL917	OBSOLETE	PDIP	N	4		TBD	Call TI	Call TI
TIL917B	OBSOLETE	PDIP	N	4		TBD	Call TI	Call TI
TIL917C	OBSOLETE	PDIP	N	4		TBD	Call TI	Call TI
TIL918	OBSOLETE	PDIP	N	8		TBD	Call TI	Call TI
TIL918B	OBSOLETE	PDIP	N	8		TBD	Call TI	Call TI
TIL918C	OBSOLETE	PDIP	N	8		TBD	Call TI	Call TI
TIL919	OBSOLETE	PDIP	N	8		TBD	Call TI	Call TI
TIL919C	OBSOLETE			8		TBD	Call TI	Call TI

<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) 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.

**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.

## 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 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.

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.

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

<b>Products</b>		<b>Applications</b>	
Amplifiers	<a href="http://amplifier.ti.com">amplifier.ti.com</a>	Audio	<a href="http://www.ti.com/audio">www.ti.com/audio</a>
Data Converters	<a href="http://dataconverter.ti.com">dataconverter.ti.com</a>	Automotive	<a href="http://www.ti.com/automotive">www.ti.com/automotive</a>
DSP	<a href="http://dsp.ti.com">dsp.ti.com</a>	Broadband	<a href="http://www.ti.com/broadband">www.ti.com/broadband</a>
Interface	<a href="http://interface.ti.com">interface.ti.com</a>	Digital Control	<a href="http://www.ti.com/digitalcontrol">www.ti.com/digitalcontrol</a>
Logic	<a href="http://logic.ti.com">logic.ti.com</a>	Military	<a href="http://www.ti.com/military">www.ti.com/military</a>
Power Mgmt	<a href="http://power.ti.com">power.ti.com</a>	Optical Networking	<a href="http://www.ti.com/opticalnetwork">www.ti.com/opticalnetwork</a>
Microcontrollers	<a href="http://microcontroller.ti.com">microcontroller.ti.com</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