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

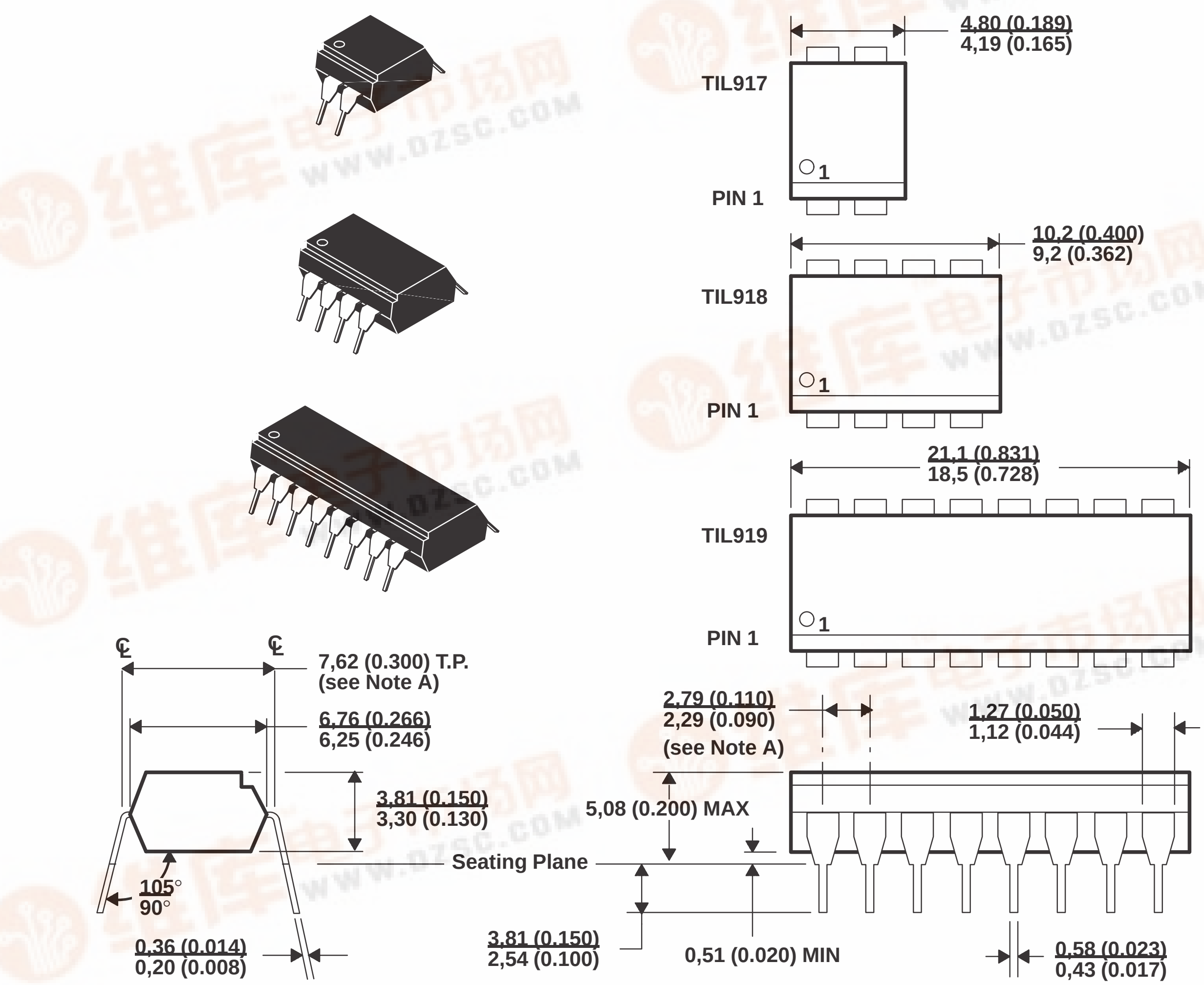
SOOS030 – FEBRUARY 1992

- **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.

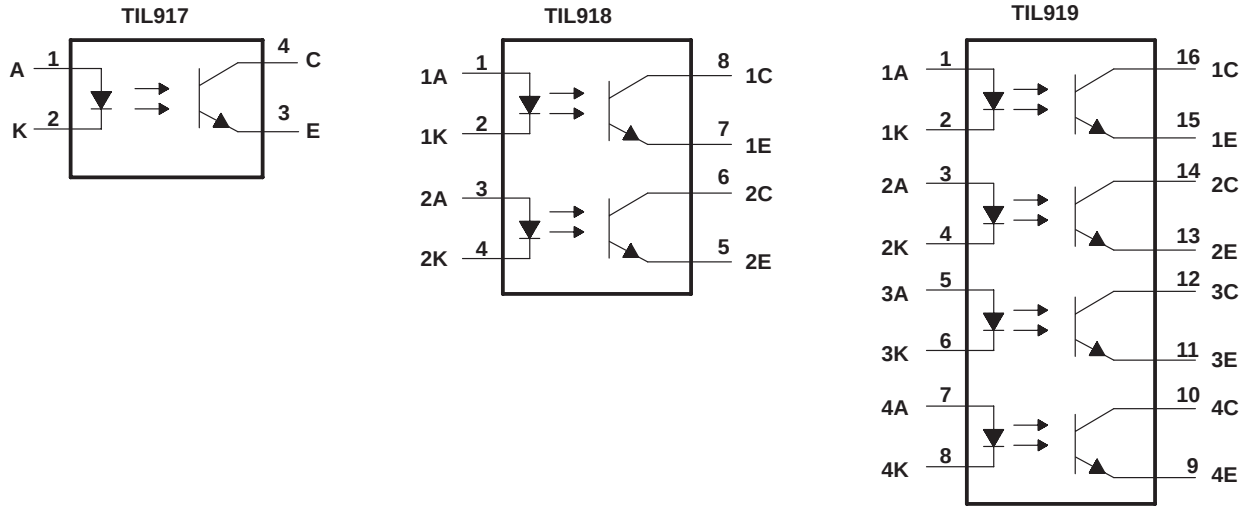
mechanical data



ALL LINEAR DIMENSIONS ARE IN MILLIMETERS AND PARENTHETICALLY IN INCHES

NOTE A: Each pin centerline is located within 0,25 (0.010) of its true longitudinal position.

schematic diagrams



absolute maximum ratings, T_A = 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_A . . . . . –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.

electrical characteristics, T_A = 25°C (unless otherwise noted)

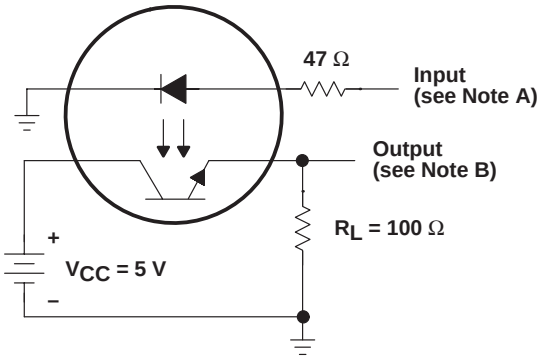
PARAMETER			TEST CONDITIONS		MIN	TYP	MAX	UNIT
$V_{(BR)CEO}$	Collector-emitter breakdown voltage		I_C = 0.5 mA,	I_F = 0	35			V
$V_{(BR)ECO}$	Emitter-collector breakdown voltage		I_C = 100 μA,	I_F = 0	7			V
I_R	Input diode static reverse current		V_R = 5 V				10	μA
$I_{C(off)}$	Off-state collector current		V_{CE} = 24 V,	I_F = 0			100	nA
CTR	Current transfer ratio	TIL917, TIL918, TIL919	I_F = 5 mA,	V_{CE} = 5 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 mA				1.4	V
$V_{CE(sat)}$	Collector-emitter saturation voltage		I_F = 5 mA,	I_C = 1 mA			0.4	V
C_{io}	Input-to-output capacitance		V_{in-out} = 0,	f = 1 MHz, See Note 6		1		pF
r_{io}	Input-to-output internal resistance		V_{in-out} = ±1 kV,	See Note 6		10^{11}		Ω

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

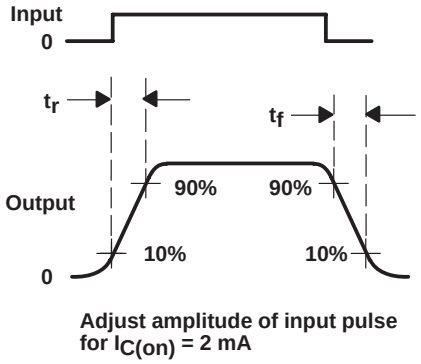
switching characteristics, T_A = 25°C

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

PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT



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

VOLTAGE WAVEFORMS

NOTES: A. The input waveform is supplied by a generator with the following characteristics: Z_O = 50 Ω, $t_r \le$ 15 ns, duty cycle = 1%, t_w = 500 μs.
B. The output waveform is monitored on an oscilloscope with the following characteristics: $t_r \le$ 12 ns, $R_{in} \ge$ 1 MΩ, $C_{in} \le$ 20 pF.

Figure 1. Switching Times

TYPICAL CHARACTERISTICS

FORWARD CURRENT vs FORWARD VOLTAGE

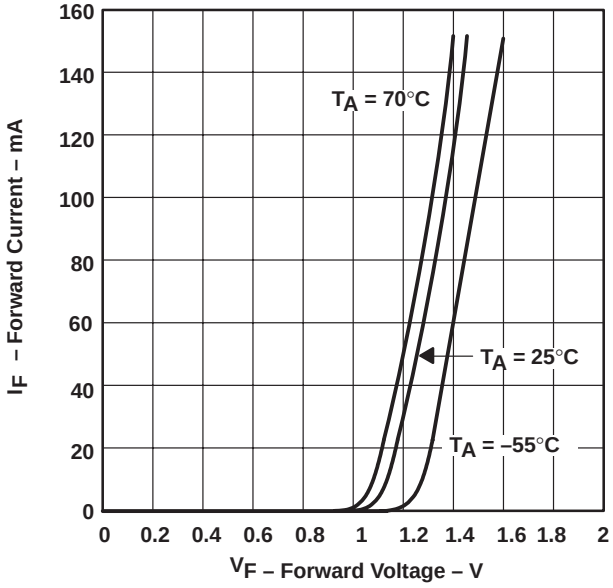


Figure 2

COLLECTOR CURRENT vs COLLECTOR-EMITTER VOLTAGE

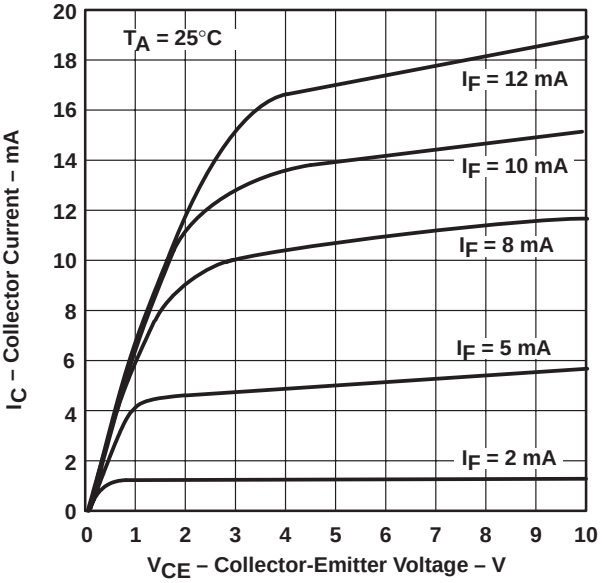


Figure 3

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

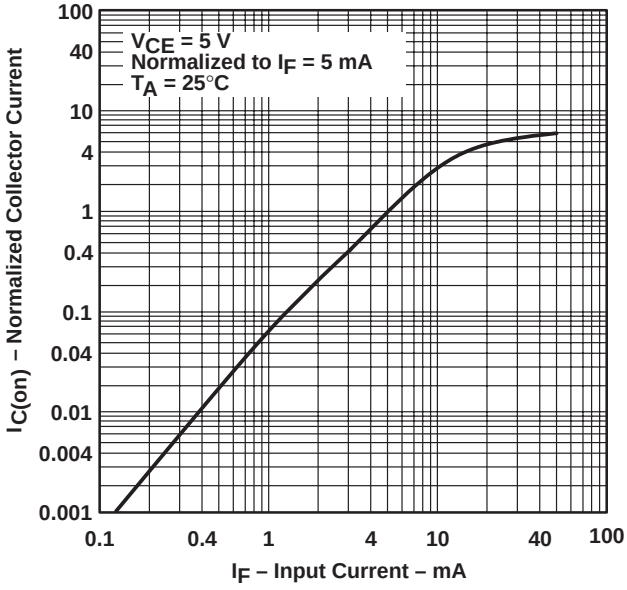


Figure 4

RELATIVE ON-STATE COLLECTOR CURRENT vs FREE-AIR TEMPERATURE

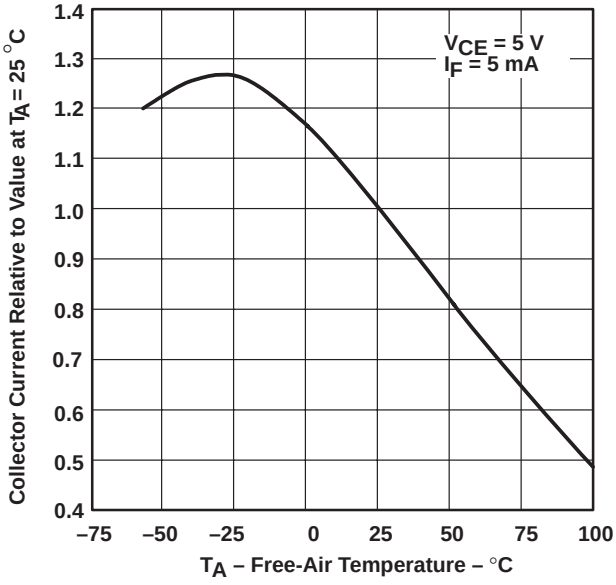


Figure 5

TYPICAL CHARACTERISTICS

TYPICAL COLLECTOR-EMITTER SATURATION VOLTAGE vs FREE-AIR TEMPERATURE

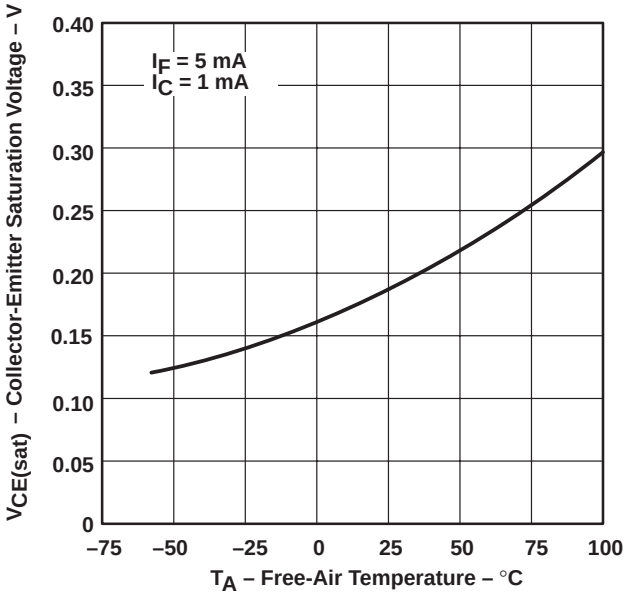


Figure 6

APPLICATION INFORMATION

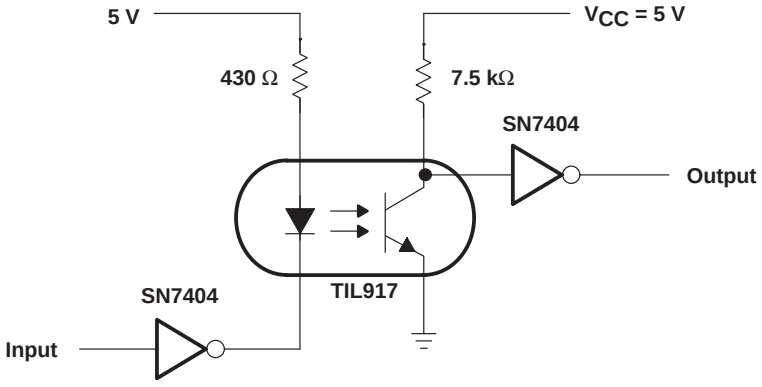


Figure 7. Data Transmission Circuit

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.