TIL917, TIL917A, TIL917B, TIL917C, TIL918, TIL918A
TIL918B, TIL918C, TIL919, TIL919A, TIL919B, TIL919C
SINGLE/DUAL/QUAD CHANNEL OPTOCOUPLERS/OPTOISOLATORS
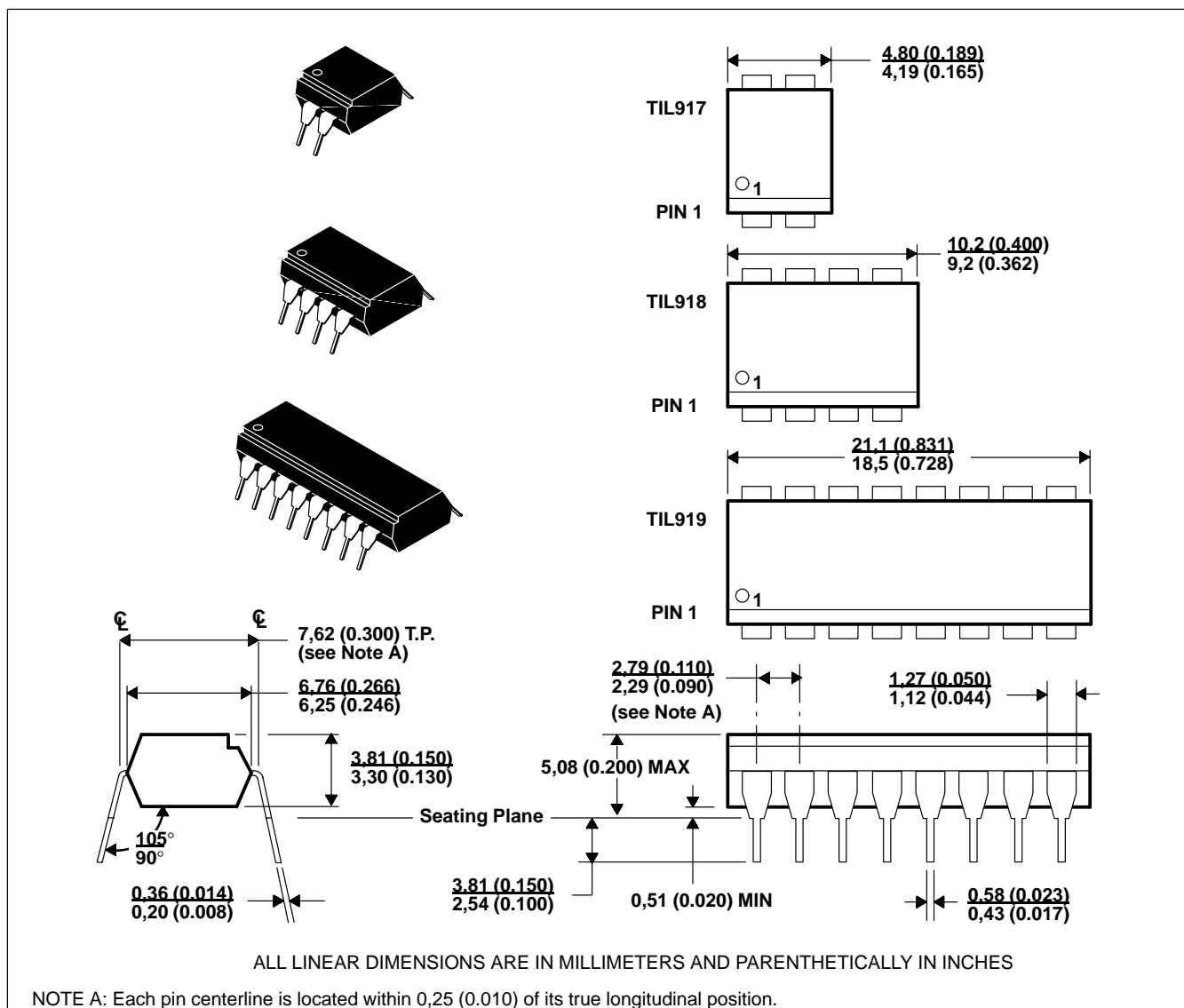
SOOS030 – FEBRUARY 1992

- **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.

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TEXAS INSTRUMENTS

schematic diagrams

TIL917

TIL918

TIL919
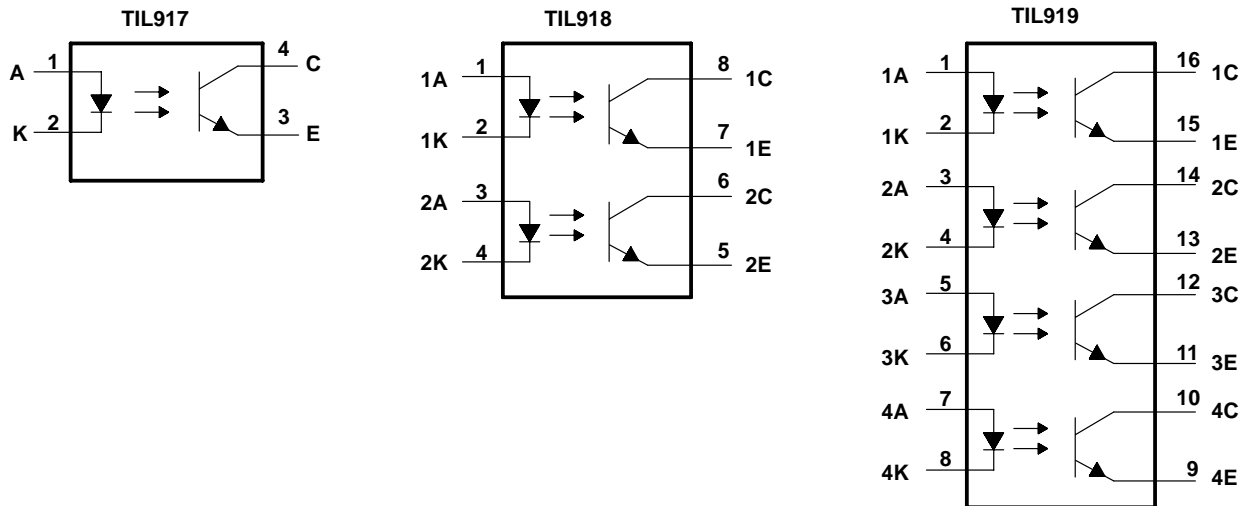
absolute maximum ratings, T_A = 25°C (unless otherwise noted)

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.

TEXAS INSTRUMENTS

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	$V_{in-out} = \pm1$ 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.
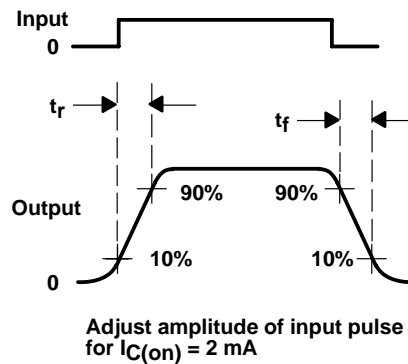
switching characteristics, $T_A = 25°C$

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
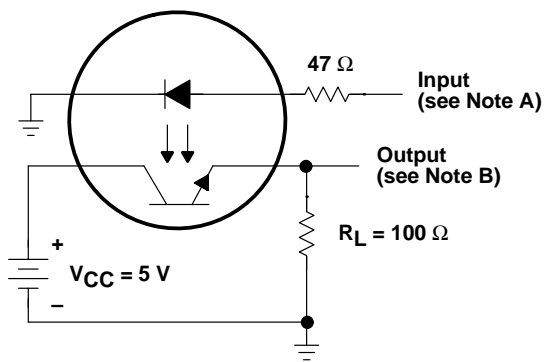
TEST CIRCUIT

VOLTAGE WAVEFORMS

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

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

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

TYPICAL CHARACTERISTICS

FORWARD CURRENT
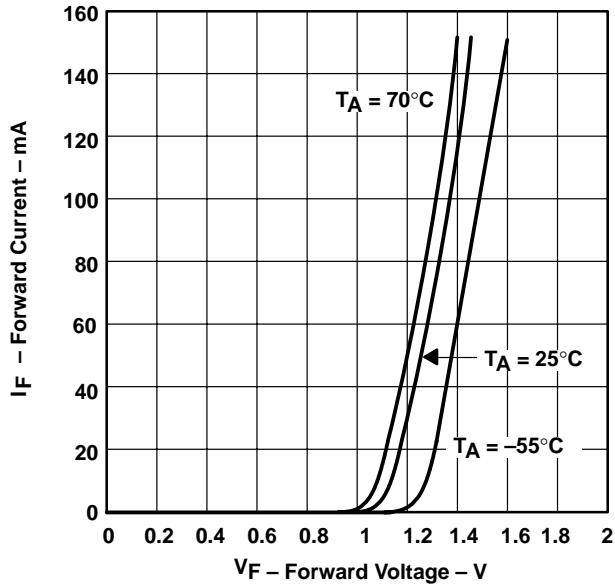**vs**
FORWARD VOLTAGE

Figure 2

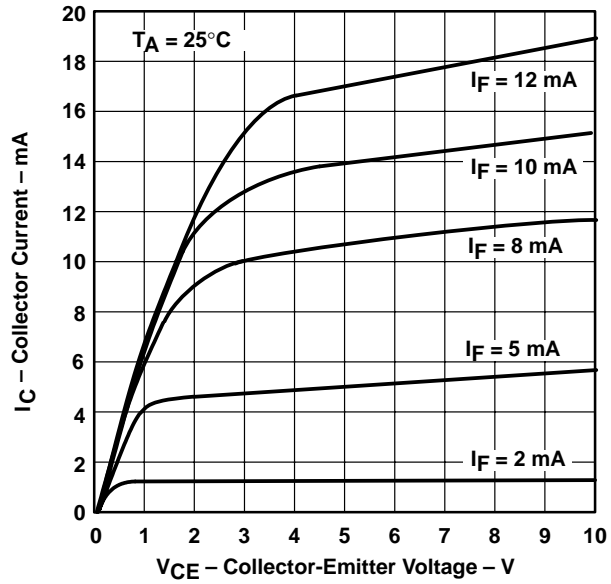**COLLECTOR CURRENT**
vs
COLLECTOR-EMITTER VOLTAGE

Figure 3

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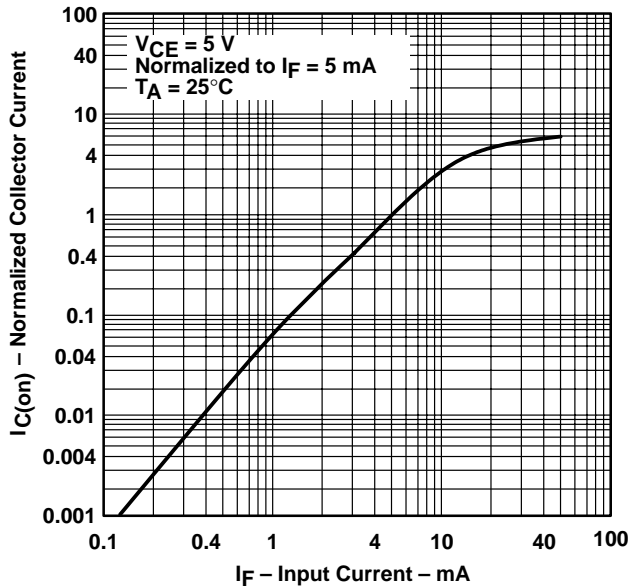**vs**
INPUT-DIODE FORWARD CURRENT

Figure 4

RELATIVE ON-STATE COLLECTOR CURRENT
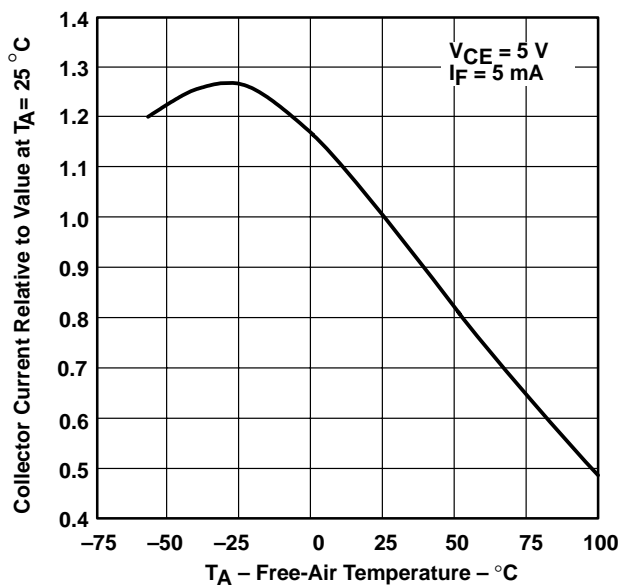**vs**
FREE-AIR TEMPERATURE

Figure 5

TEXAS
INSTRUMENTS

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TIL917, TIL917A, TIL917B, TIL917C, TIL918, TIL918A
TIL918B, TIL918C, TIL919, TIL919A, TIL919B, TIL919C
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TYPICAL CHARACTERISTICS

TYPICAL COLLECTOR-EMITTER SATURATION VOLTAGE
vs
FREE-AIR TEMPERATURE

I_F = 5 mA
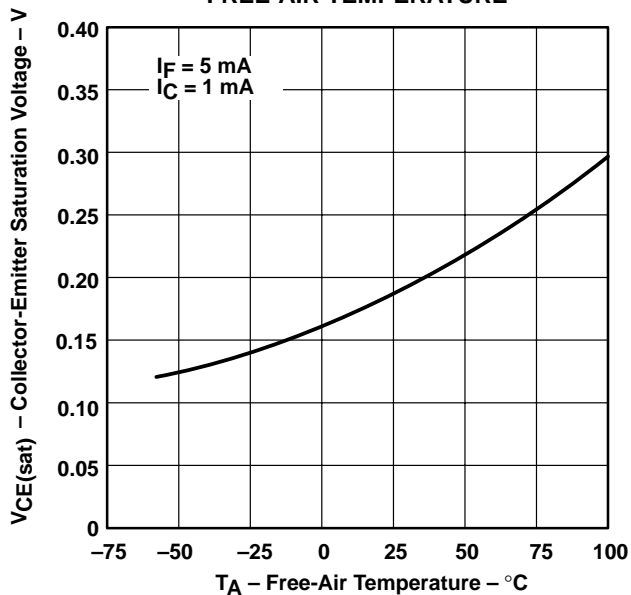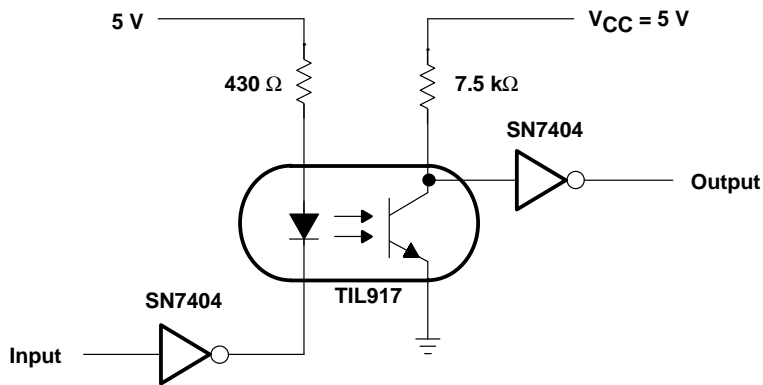I_C = 1 mA

Figure 6

APPLICATION INFORMATION

Figure 7. Data Transmission Circuit

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