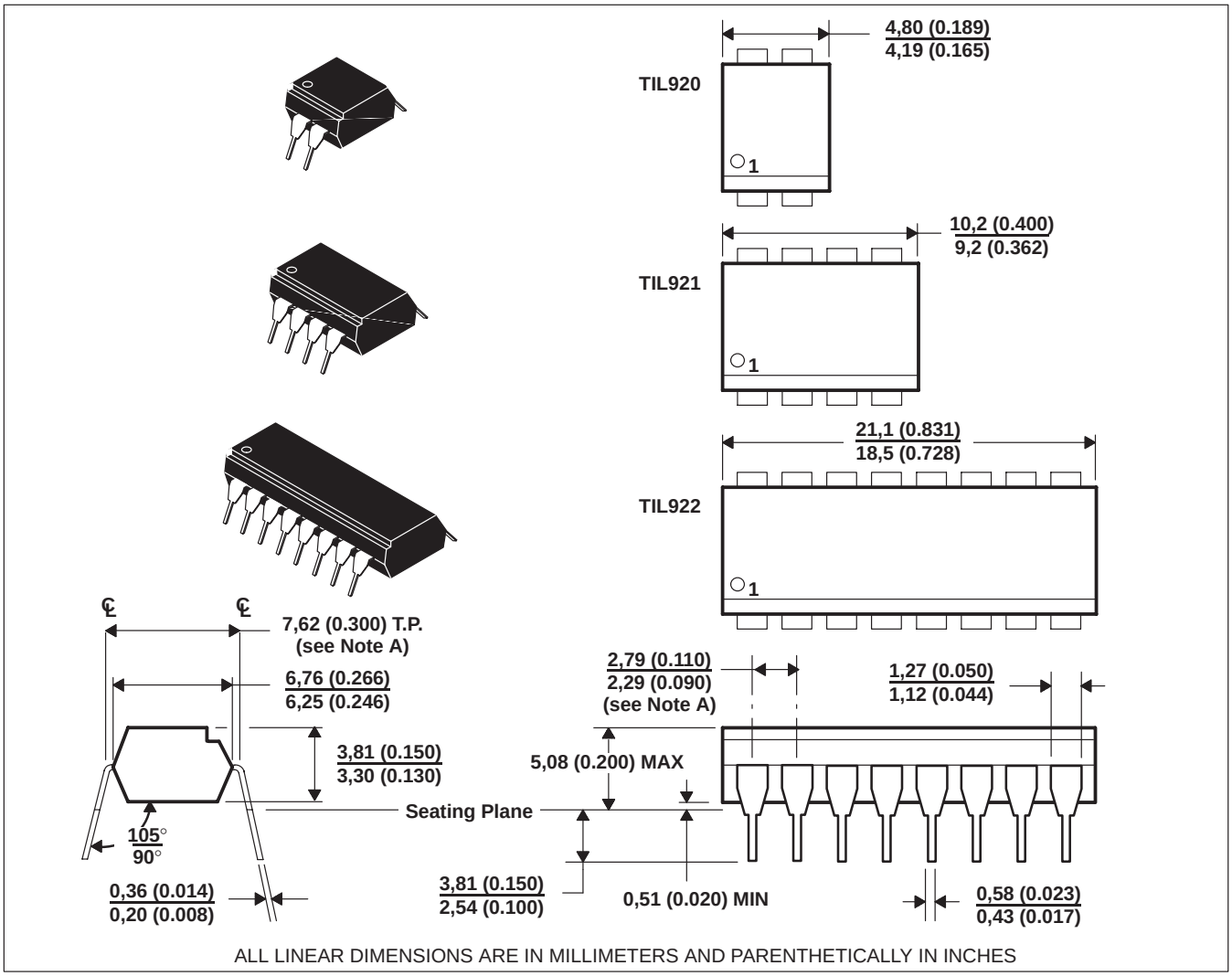
- **AC Signal Input**
- **Gallium-Arsenide Diode Infrared Source**
- **Source Is Optically Coupled to Silicon N-P-N Phototransistor**
- **Choice of One, Two, or Four Channels**
- **Choice of Three Current-Transfer Ratios**
- **High-Voltage Electrical Isolation . . . 7.5 kV Peak (5.3 kV rms)**
- **Plastic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

description

These optocouplers consist of two gallium-arsenide light-emitting diodes connected in a reverse-parallel configuration for ac-input applications and a silicon n-p-n phototransistor per channel. The TIL920 has one channel in a 4-pin package, the TIL921 has two channels in an 8-pin package, and the TIL922 has four channels in a 16-pin package. The standard devices, TIL920, TIL921, and TIL922, are tested for a current-transfer ratio of 20% minimum. Devices selected for a current-transfer ratio of 50% and 100% minimum are designated with the suffix A and B respectively.

mechanical data



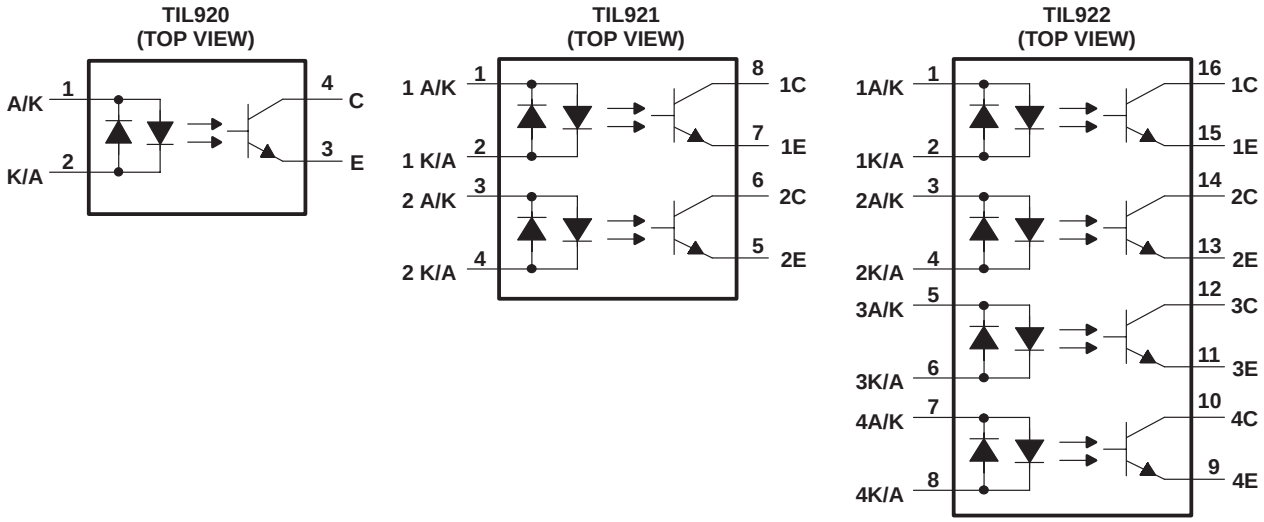
ALL LINEAR DIMENSIONS ARE IN MILLIMETERS AND PARENTHETICALLY IN INCHES

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

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.

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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 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 range, 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
$I_{C(off)}$	Off-state collector current		V_{CE} = 24 V,	I_F = 0			100	nA
CTR†	Current transfer ratio	TIL920, TIL921, TIL922	I_F = 5 mA,	V_{CE} = 5 V	20%			
		TIL920A, TIL921A, TIL922A			50%			
		TIL920B, TIL921B, TIL922B			100%			
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
$I_{C(on)1}$ / $I_{C(on)2}$	On-state collector current symmetry ratio (see Note 7)		V_{CE} = 5 V,	I_F = 5 mA	1		3	

† These parameters apply to either direction of the input current.

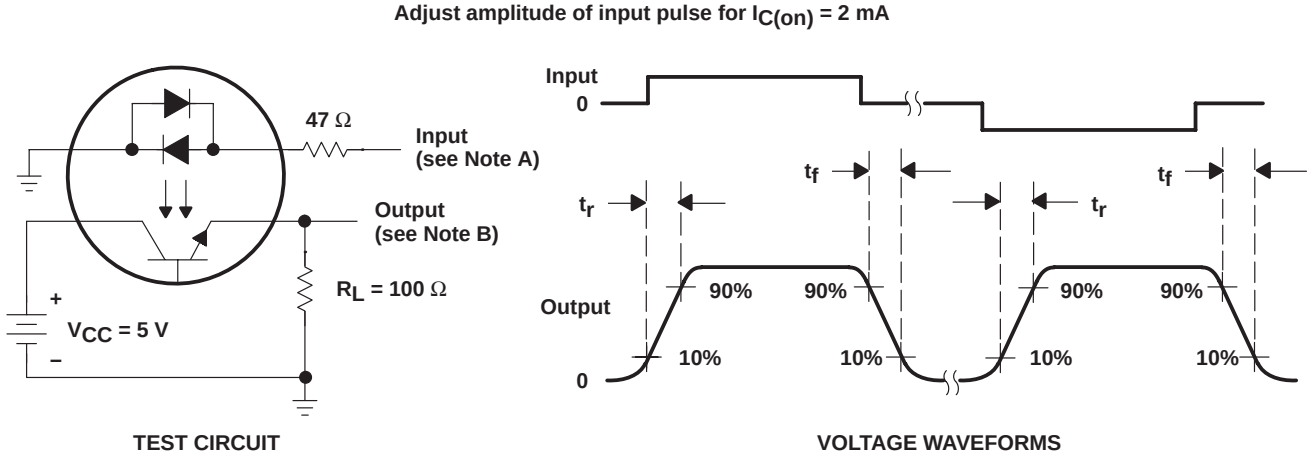
NOTES: 6. These parameters are measured between all input-diode leads shorted together and all phototransistor leads shorted together.
7. The higher of the two values of $I_{C(on)}$ generated by the two diodes is taken as $I_{C(on)1}$.

switching characteristics, T_A = 25°C

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

† These parameters apply to either direction of the input current.

PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT 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%.
B. The output waveform is monitored on an oscilloscope with the following characteristics: $t_r \le 12$ ns, $R_i \ge 1$ MΩ, $C_i \le 20$ pF.

Figure 1. Switching Times

TYPICAL CHARACTERISTICS

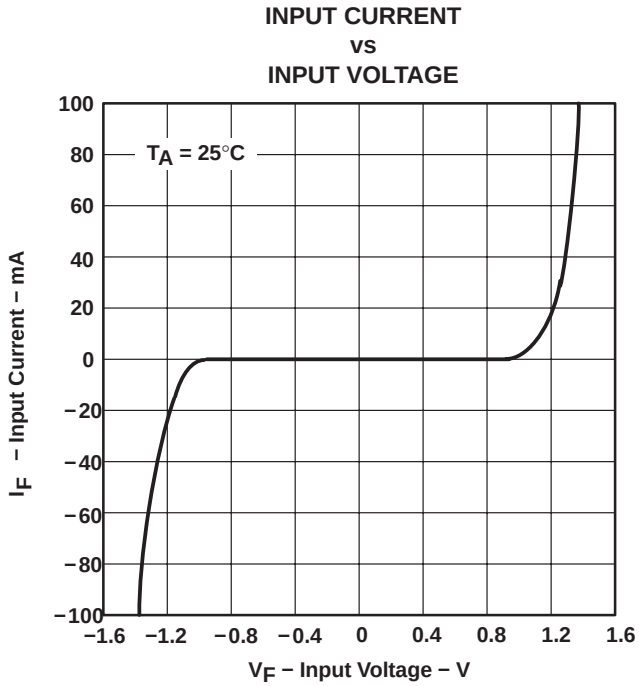


Figure 2

TYPICAL CHARACTERISTICS

COLLECTOR CURRENT vs COLLECTOR-EMITTER VOLTAGE

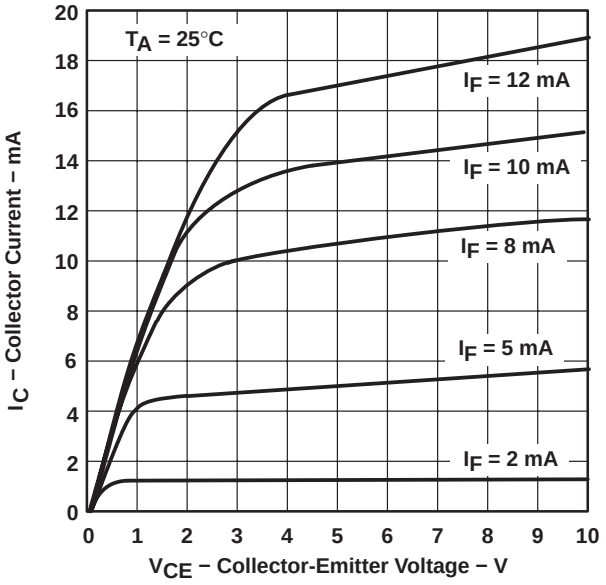


Figure 3

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

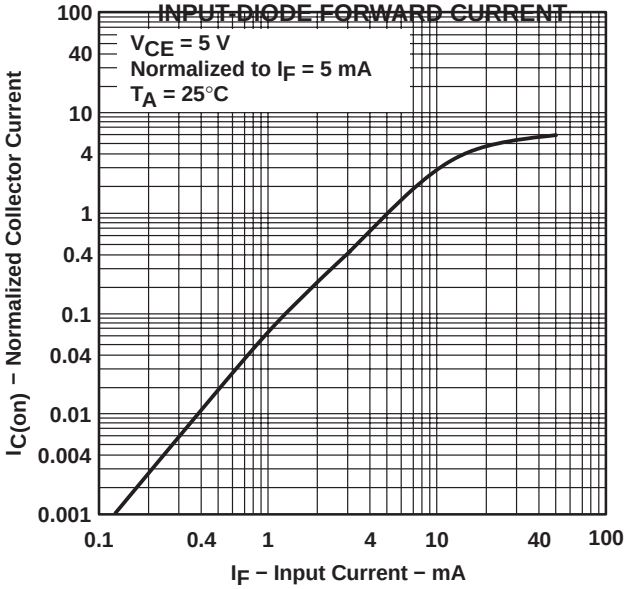


Figure 4

RELATIVE ON-STATE COLLECTOR CURRENT vs FREE-AIR TEMPERATURE

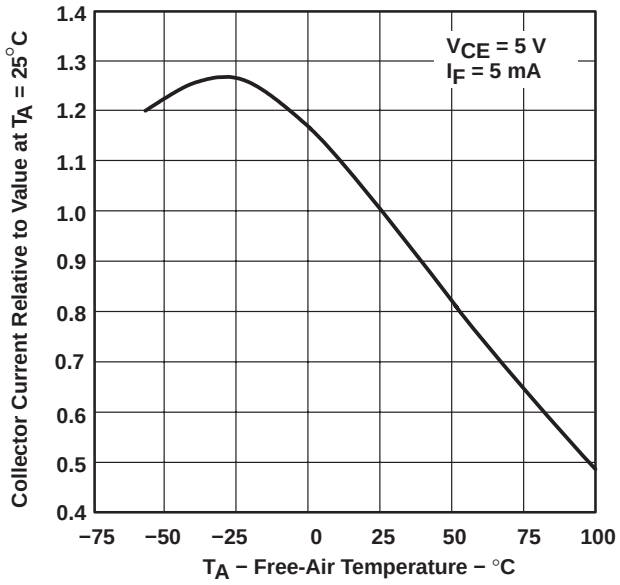


Figure 5

TYPICAL COLLECTOR-EMITTER SATURATION VOLT vs FREE-AIR TEMPERATURE

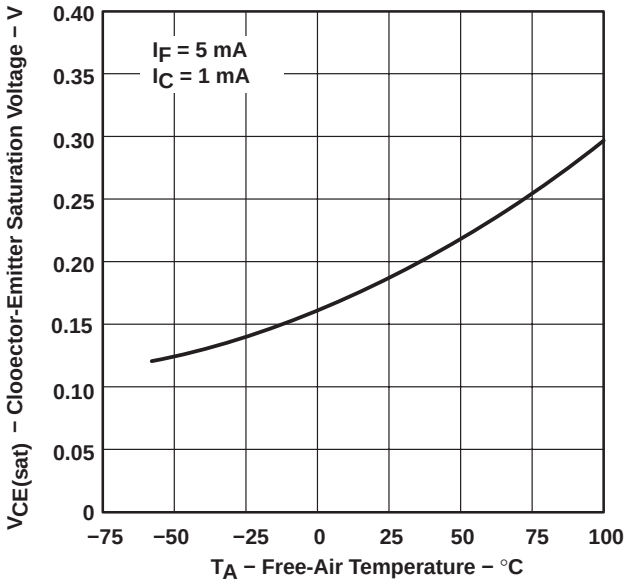


Figure 6

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