

TIL920, TIL921, TIL922, TIL920A, TIL921A, TIL922A
TIL920B, TIL921B, TIL922B
SINGLE/DUAL/QUAD CHANNEL OPTOCOUPLERS

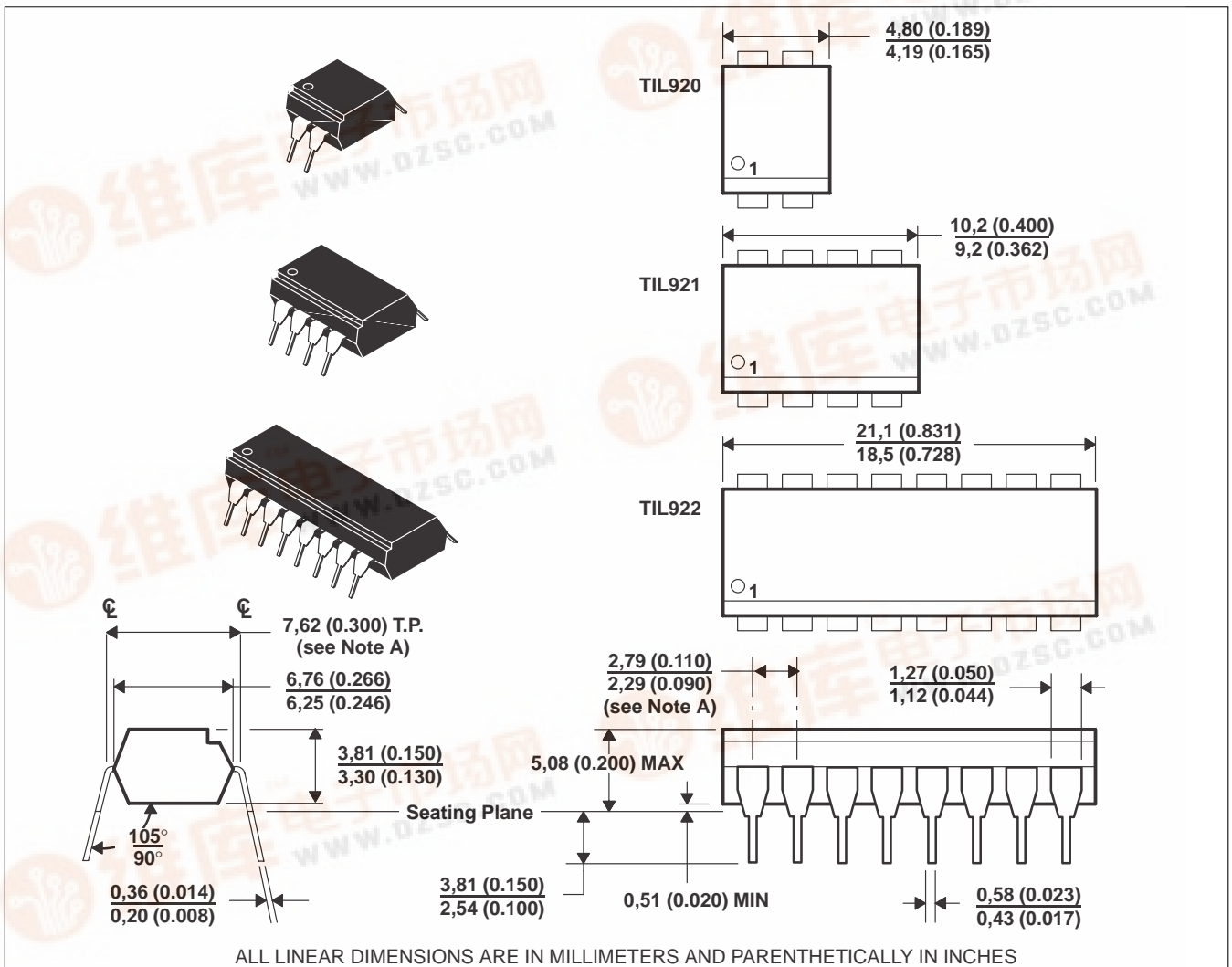
SOOS032-D3908, FEBRUARY 1992

- 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



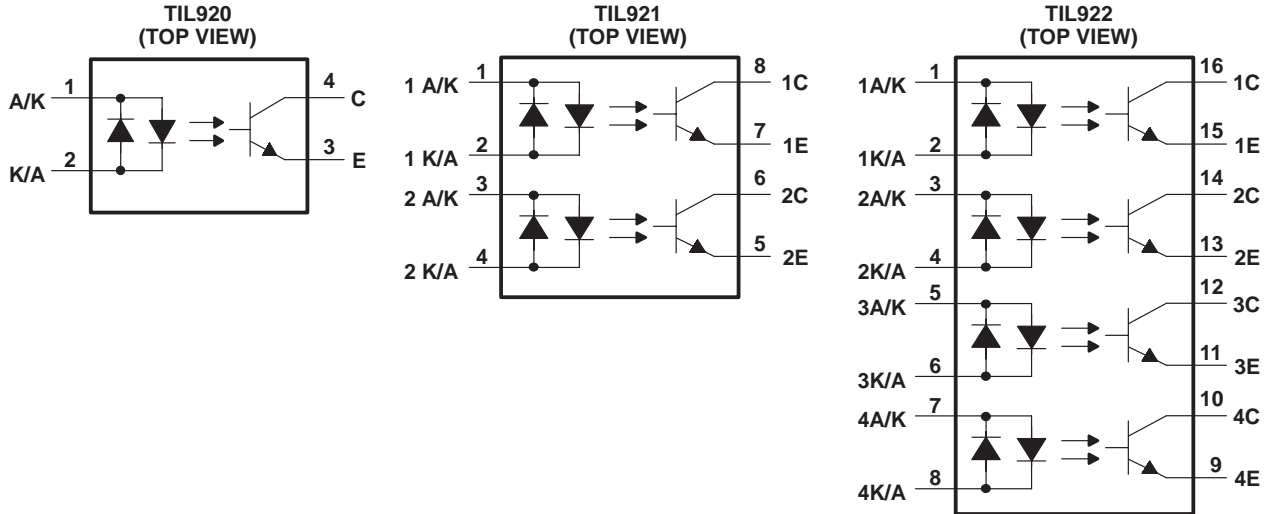
NOTE A: Each pin centerline is located 0,25 (0.010) of its true longitudinal position.



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schematic diagrams



absolute maximum ratings, $T_A = 25^\circ\text{C}$ (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/ $^\circ\text{C}$.
 4. Derate linearly to 100°C free-air temperature at the rate of 2 mW/ $^\circ\text{C}$.
 5. Derate linearly to 100°C free-air temperature at the rate of 2.67 mW/ $^\circ\text{C}$.

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	$I_C = 0.5$ 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^\dagger	Current transfer ratio	TIL920, TIL921, TIL922		20%		
		TIL920A, TIL921A, TIL922A	$I_F = 5$ mA, $V_{CE} = 5$ V		50%	
		TIL920B, TIL921B, TIL922B			100%	
V_F^\dagger	Input diode static forward voltage	$I_F = 20$ mA			1.4	V
$V_{CE(sat)}^\dagger$	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	$V_{in-out} = \pm 1$ 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 $I_{C(on)1}$.

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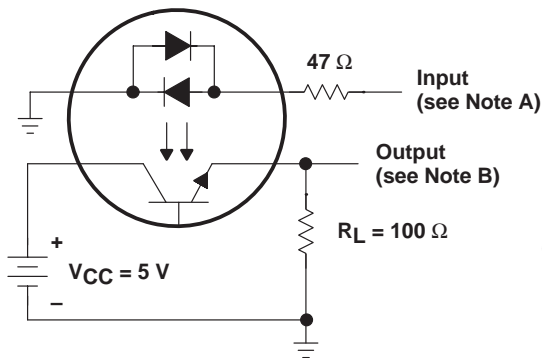
switching characteristics, $T_A = 25^\circ\text{C}$

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

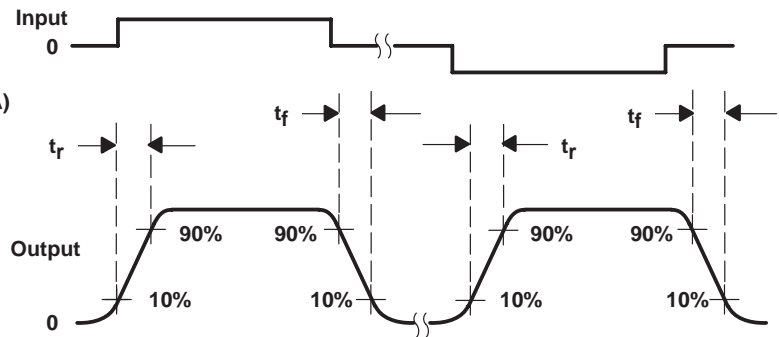
† These parameters apply to either direction of the input current.

PARAMETER MEASUREMENT INFORMATION

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



TEST CIRCUIT



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%.
 B. The output waveform is monitored on an oscilloscope with the following characteristics: $t_r \leq 12\text{ ns}$, $R_i \geq 1\text{ M}\Omega$, $C_i \leq 20\text{ pF}$.

Figure 1. Switching Times

TYPICAL CHARACTERISTICS

INPUT CURRENT
 vs
 INPUT VOLTAGE

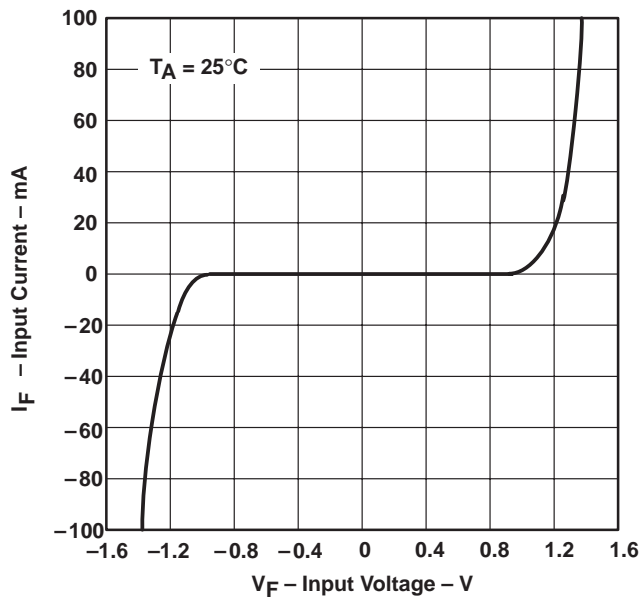


Figure 2

TYPICAL CHARACTERISTICS

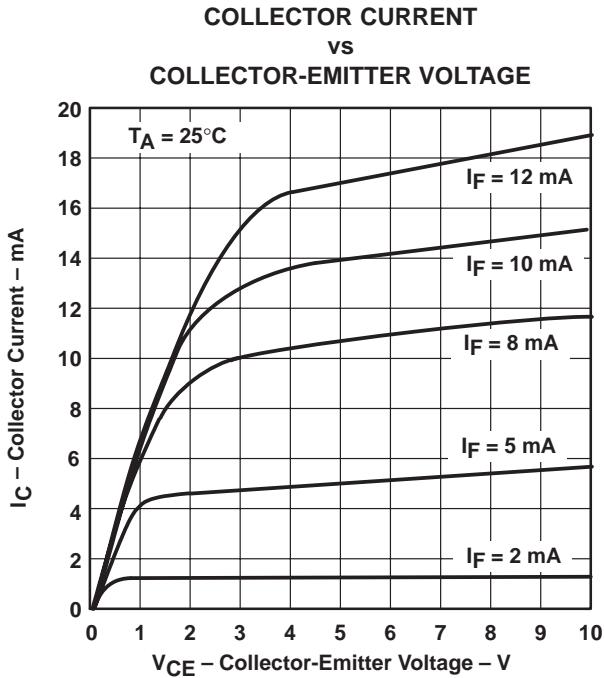


Figure 3

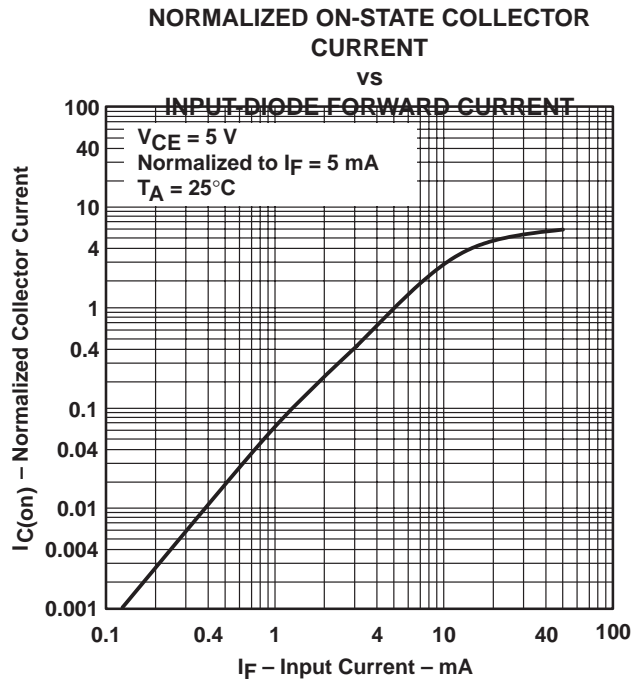


Figure 4

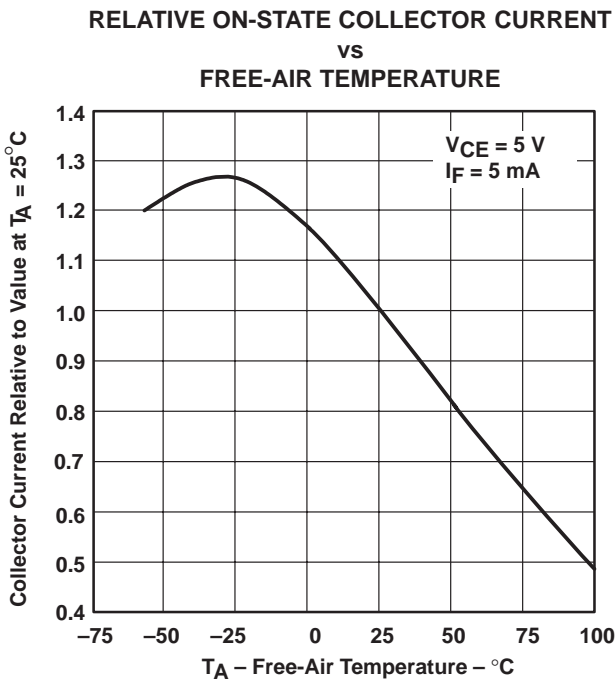


Figure 5

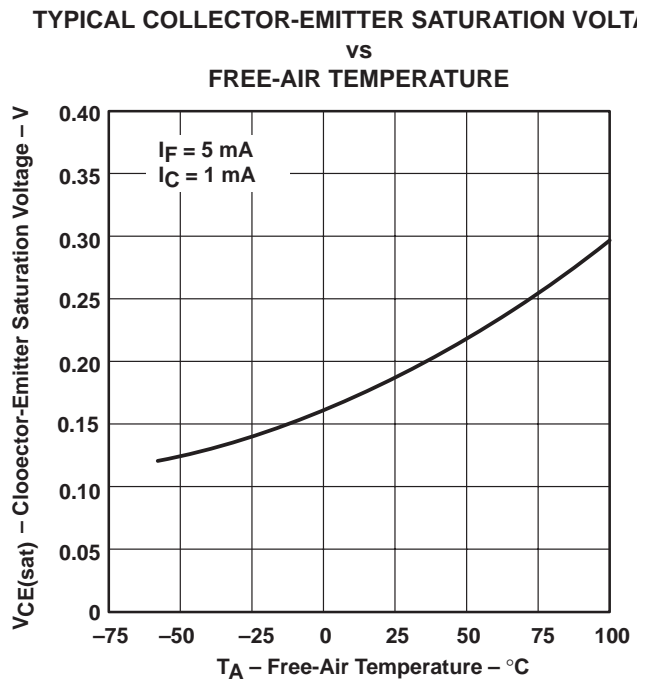


Figure 6

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