

# TIL197, TIL198, TIL199, TIL197A, TIL198A, TIL199A TIL197B, TIL198B, TIL199B SINGLE/DUAL/QUAD CHANNEL OPTOCOUPLEDERS/OPTOISOLATORS

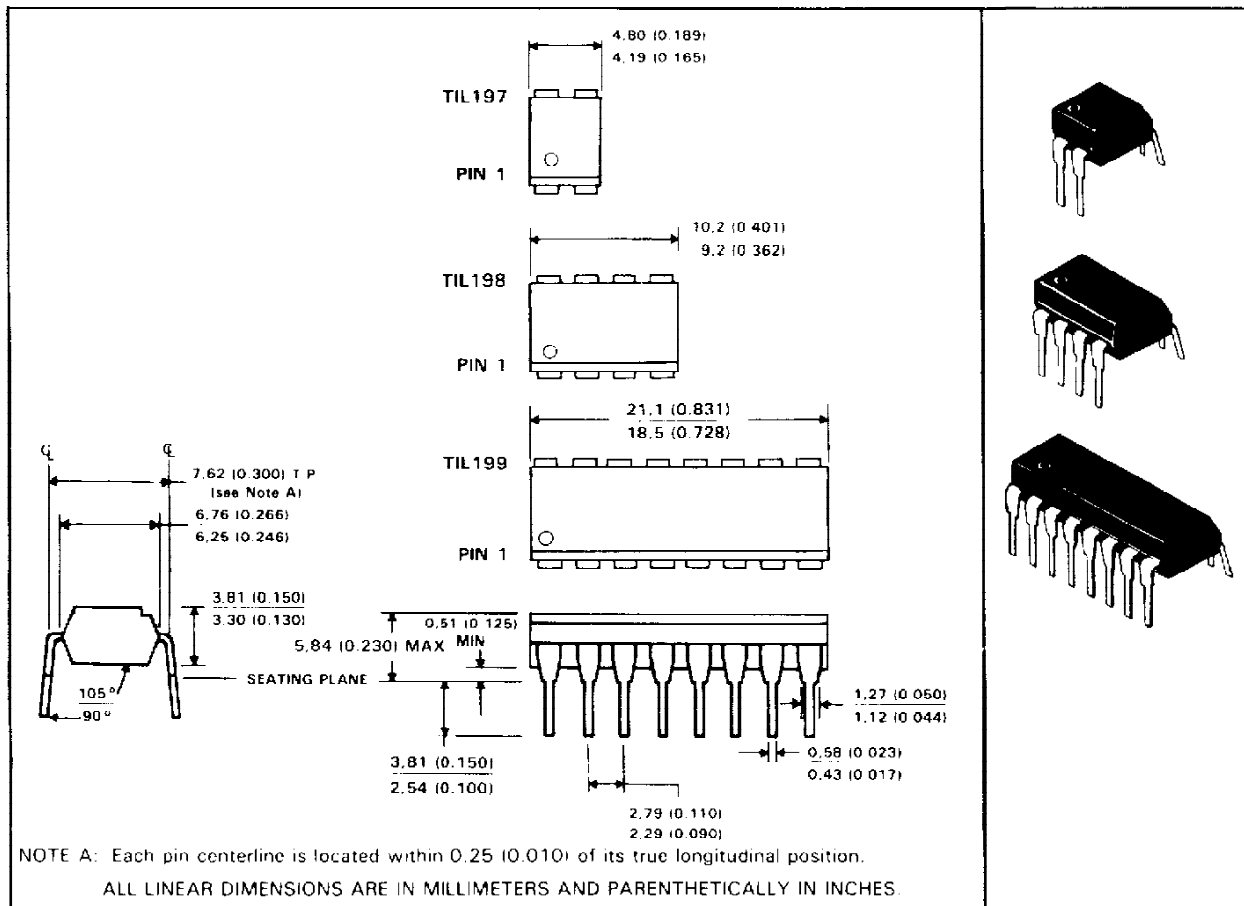
SOOS023 D3437, MAY 1990

- 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 Three Current-Transfer Ratios
- High-Voltage Electrical Isolation 3.535 kV Peak (2.5 kV rms)
- Plastic Dual-In-Line Packages
- UL Listed – File #E65085

## description

These optocouplers consist of a gallium-arsenide light-emitting diode and a silicon n-p-n Darlington phototransistor per channel. The TIL197 has one channel in a 4-pin package, the TIL198 has two channels in a 8-pin package, and the TIL199 has four channels in a 16-pin package. The standard devices, TIL197, TIL198, and TIL199, are tested for a current-transfer ratio of 500% minimum. Devices selected for a current-transfer ratio of 1000% and 1500% minimum are designated with the suffixes A and B, respectively.

## mechanical data



PRODUCTION DATA documents contain information 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.

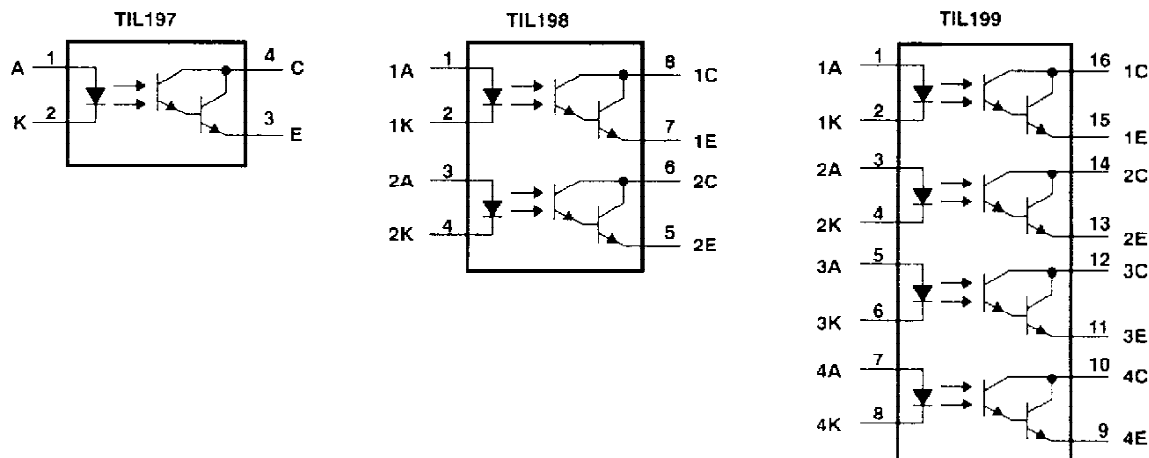
**TEXAS  
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**TIL197, TIL198, TIL199, TIL197A, TIL198A, TIL199A  
TIL197B, TIL198B, TIL199B  
SINGLE/DUAL/QUAD CHANNEL OPTOCOUPLERS/OPTOISOLATORS**

**schematic diagrams**



**absolute maximum ratings at 25°C free-air temperature (unless otherwise noted)**

Input-to-output voltage (see Note 1)	±3.535 kV peak or dc (±2.5 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
Storage temperature range	- 55°C to 125°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260°C

- NOTE 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 at 25°C free-air temperature range (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	$V_{CE} = 10 \text{ V}$ , $I_F = 0$			100	nA
CTR	Current transfer ratio	TIL197, TIL198, TIL199		500%		
		TIL197A, TIL198A, TIL199A	$I_F = 2 \text{ mA}$ , $V_{CE} = 1 \text{ V}$	1000%		
		TIL197B, TIL198B, TIL199B		1500%		
$V_F$	Input diode static forward voltage	$I_F = 20 \text{ mA}$			1.4	V
$V_{CE(sat)}$	Collector-emitter saturation voltage	$I_F = 10 \text{ mA}$ , $I_C = 50 \text{ mA}$			1	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.

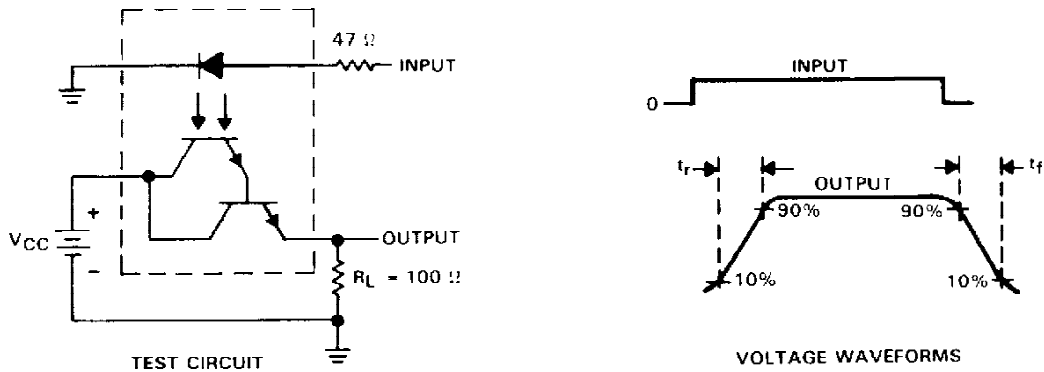
**TIL197, TIL198, TIL199, TIL197A, TIL198A, TIL199A  
TIL197B, TIL198B, TIL199B  
SINGLE/DUAL/QUAD CHANNEL OPTOCOUPLERS/OPTOISOLATORS**

switching characteristics at 25°C free-air temperature

PARAMETER	TEST CONDITIONS	TYP	UNIT
$t_r$ Rise time	$V_{CC} = 10\text{ V}$ , $I_{C(on)} = 10\text{ mA}$ ,	100	$\mu\text{s}$
$t_f$ Fall time	$R_L = 100\ \Omega$ , See Figure 1	100	

**PARAMETER MEASUREMENT INFORMATION**

Adjust amplitude of input pulse for  
 $I_{C(on)} = 10\text{ mA}$

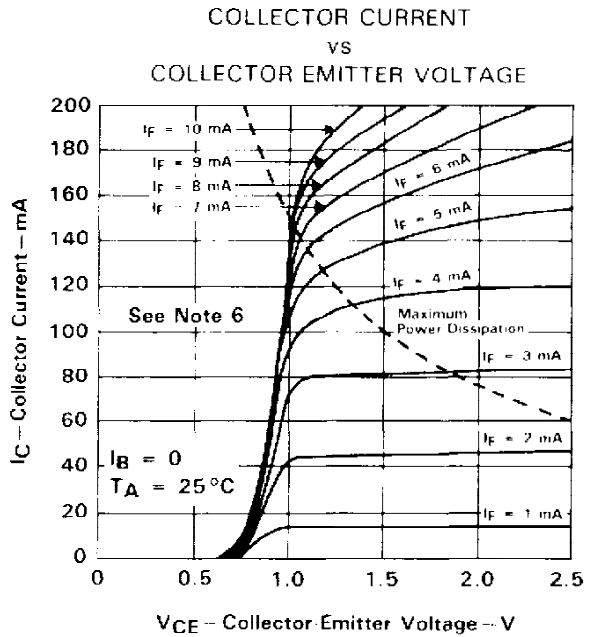
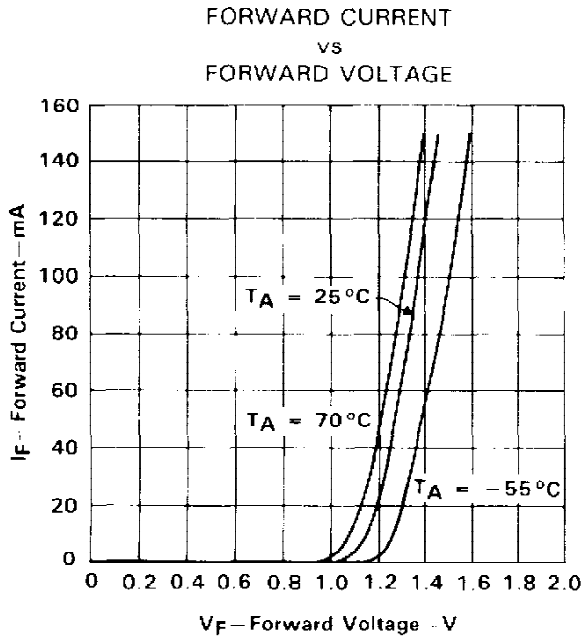


NOTES: A. The input waveform is supplied by a generator with the following characteristics:  $Z_0 = 50\ \Omega$ ,  $t_r \leq 15\text{ ns}$ , duty cycle = 1%,  $t_W = 500\ \mu\text{s}$ .  
B. The output waveform is monitored on an oscilloscope with the following characteristics:  $t_r \leq 12\text{ ns}$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

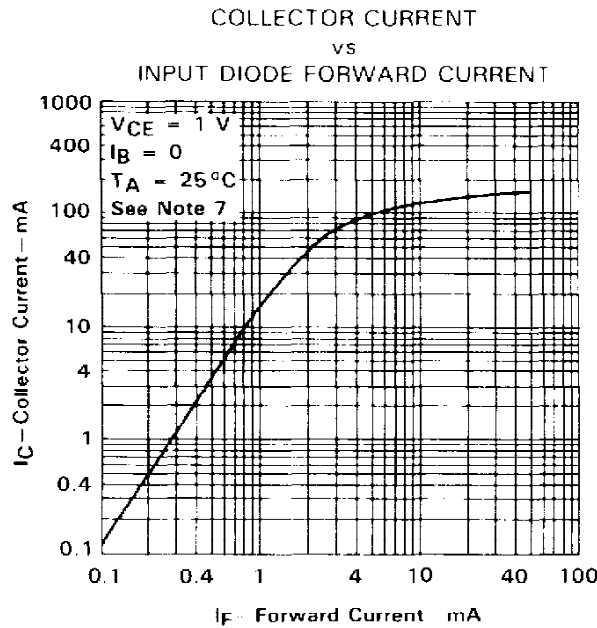
**Figure 1. Switching Times**

TIL197, TIL198, TIL199, TIL197A, TIL198A, TIL199A  
 TIL197B, TIL198B, TIL199B  
 SINGLE/DUAL/QUAD CHANNEL OPTOCOUPPLERS/OPTOISOLATORS

TYPICAL CHARACTERISTICS



NOTE 6: Pulse operation is required for operation beyond limits shown by the dashed line.



NOTE 7: These parameters were measured using pulse techniques  $t_w = 1$  ms, duty cycle  $\approx 2\%$ .

TIL197, TIL198, TIL199, TIL197A, TIL198A, TIL199A  
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TYPICAL CHARACTERISTICS

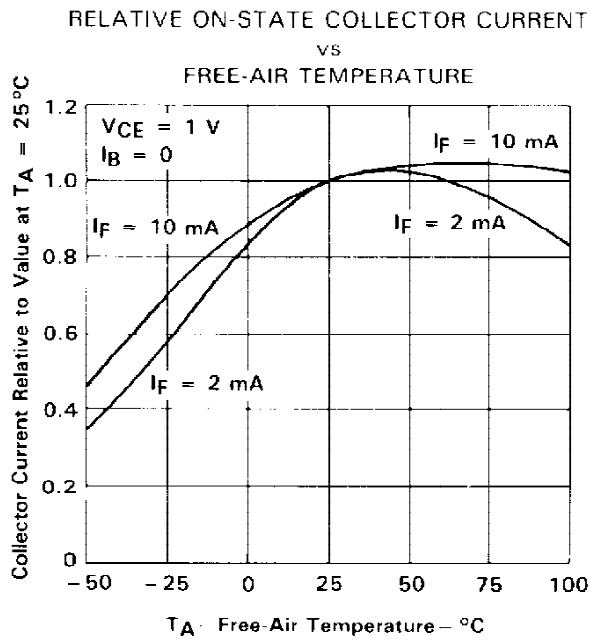


Figure 5

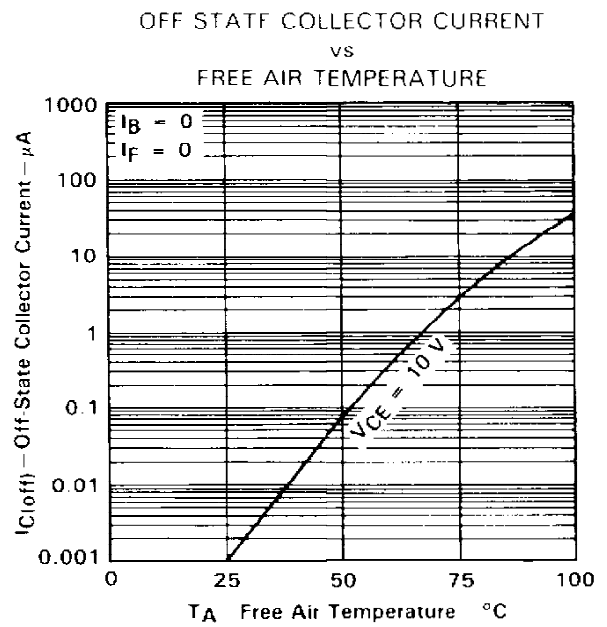


Figure 6

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