

TIL191, TIL192, TIL193, TIL191A, TIL192A, TIL193A TIL191B, TIL192B, TIL193B OPTOCOUPLED

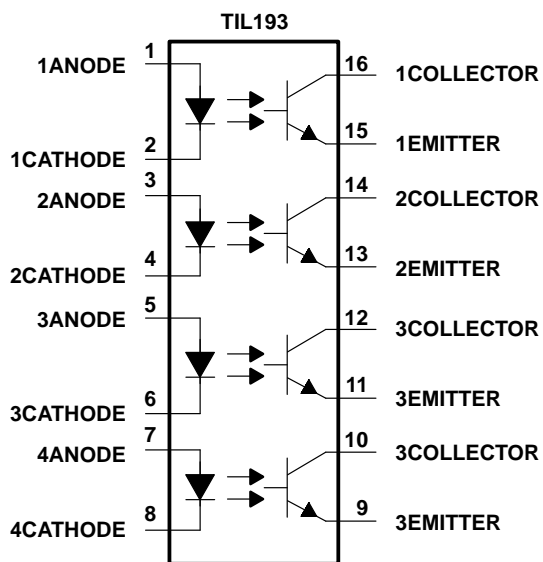
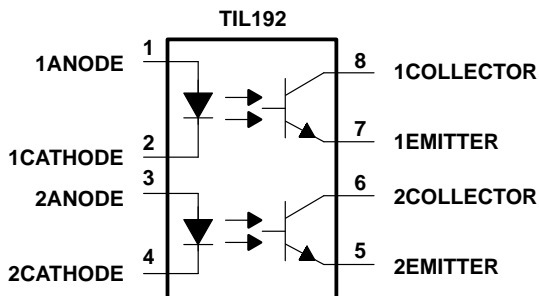
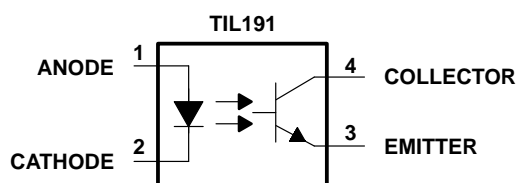
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- Gallium-Arsenide-Diode Infrared Source
- Source Is Optically Coupled to Silicon npn Phototransistor
- Choice of One, Two, or Four Channels
- Choice of Three Current-Transfer Ratios
- High-Voltage Electrical Isolation 3.535 kV Peak (2.5 kV rms)
- Plastic Dual-In-Line Packages
- UL Listed — File #E65085

description

These optocouplers consist of a gallium-arsenide light-emitting diode and a silicon npn phototransistor per channel. The TIL191 has a channel in a 4-terminal package, the TIL192 has two channels in an 8-terminal package, and the TIL193 has four channels in a 16-terminal package. The standard devices, TIL191, TIL192, and TIL193, 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.

schematic diagrams



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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.

**TEXAS
INSTRUMENTS**

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TIL191, TIL192, TIL193, TIL191A, TIL192A, TIL193A TIL191B, TIL192B, TIL193B OPTOCOUPERS

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absolute maximum ratings at 25°C free-air (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 total 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, T _{stg}	-55°C to 125°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260°C

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

- NOTES:
1. This rating applies for sine-wave operation at 50 Hz or 60 Hz. This 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 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 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	TIL191, TIL192, TIL193	I _F = 5 mA V _{CE} = 5 V	20%			
		TIL191A, TIL192A, TIL193A		50%			
		TIL191B, TIL192B, TIL193B		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 mA	f = 1 MHz,		1		pF
r _{io}	Input-to-output internal resistance	V _{in-out} = ±1 mA	See Note 6		10 ¹¹		Ω

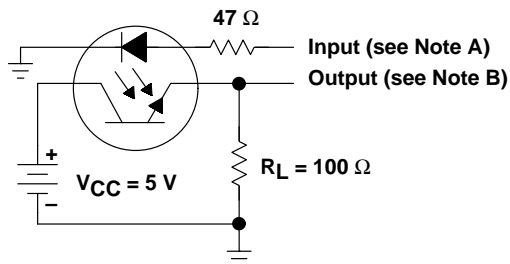
NOTE 6: These parameters are measured between all input diode leads shorted together and all phototransistor leads shorted together.

switching characteristics at 25°C free-air temperature

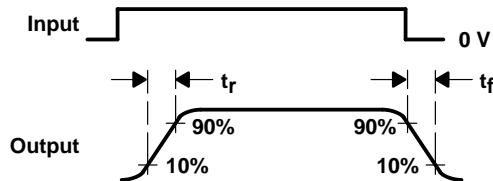
PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
t _r	Rise time	V _{CC} = 5 V, R _L = 100 Ω,	I _{C(on)} = 2 mA, See Figure 1		6		µs
t _f	Fall time				6		



PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT



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

VOLTAGE WAVEFORMS

- NOTES: A. The input waveform is supplied by a generator with the following characteristics: $Z_{OUT} = 50 \Omega$, $t_r \leq 15 \text{ ns}$, $t_w = 100 \mu\text{s}$.
 B. The output waveform is monitored on an oscilloscope with the following characteristic: $t_r \leq 12 \text{ ns}$, $R_{in} \geq 1 \text{ M}\Omega$, $C_{in} \leq 20 \text{ pF}$.

Figure 1. Switching Times

TYPICAL CHARACTERISTICS

FORWARD CURRENT
 VS
 FORWARD VOLTAGE

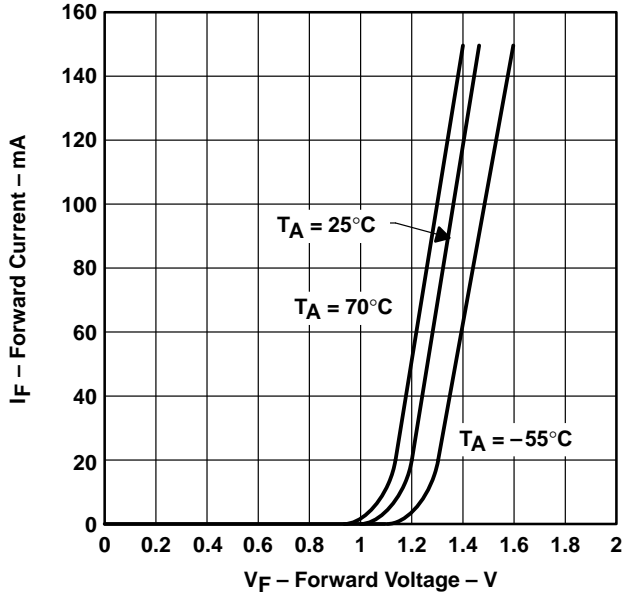


Figure 2

TIL191, TIL192, TIL193
 COLLECTOR CURRENT
 VS
 COLLECTOR-EMITTER VOLTAGE

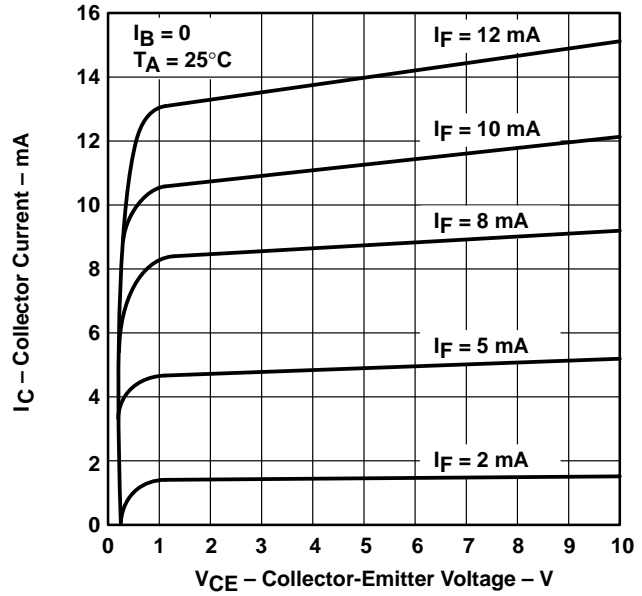


Figure 3

ON-STATE COLLECTOR CURRENT (NORMALIZED)
 VS
 INPUT DIODE FORWARD CURRENT

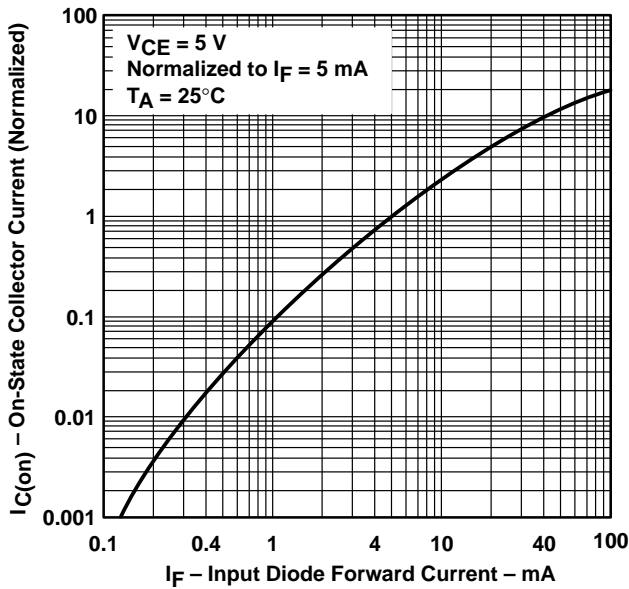


Figure 4

ON-STATE COLLECTOR CURRENT
 (RELATIVE TO VALUE AT 25°C)
 VS
 FREE-AIR TEMPERATURE

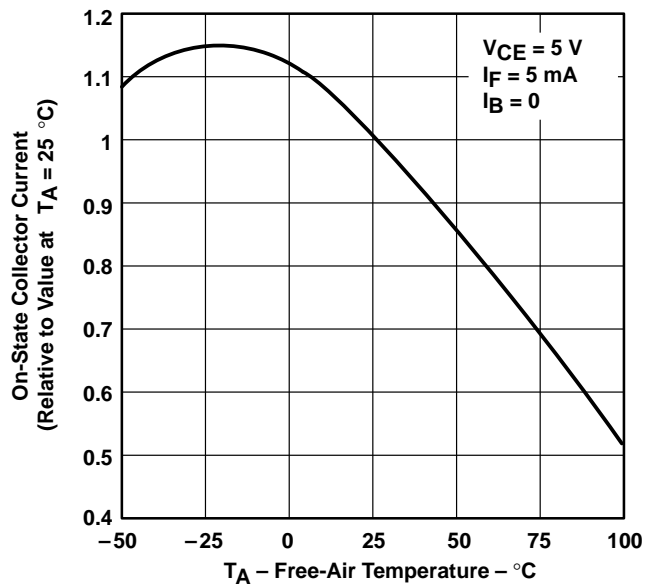


Figure 5

TYPICAL CHARACTERISTICS

**COLLECTOR-EMITTER SATURATION VOLTAGE
 vs
 FREE-AIR TEMPERATURE**

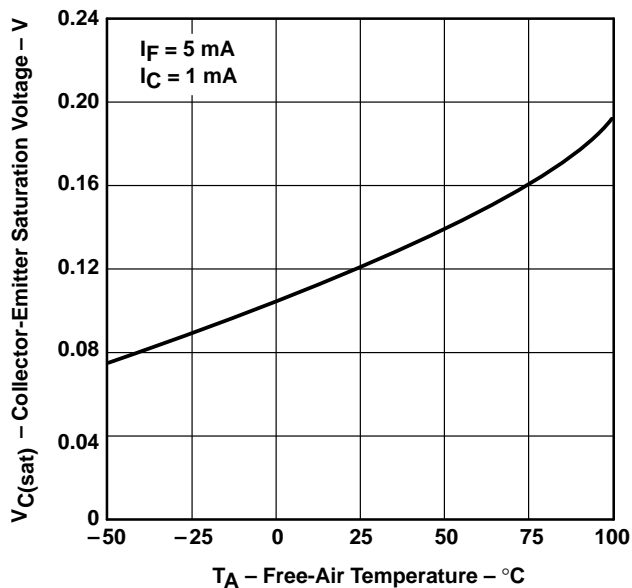


Figure 6

APPLICATION INFORMATION

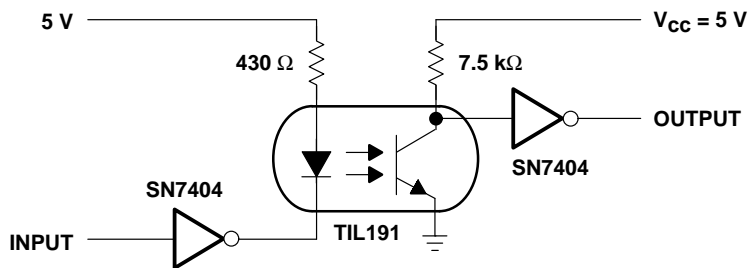
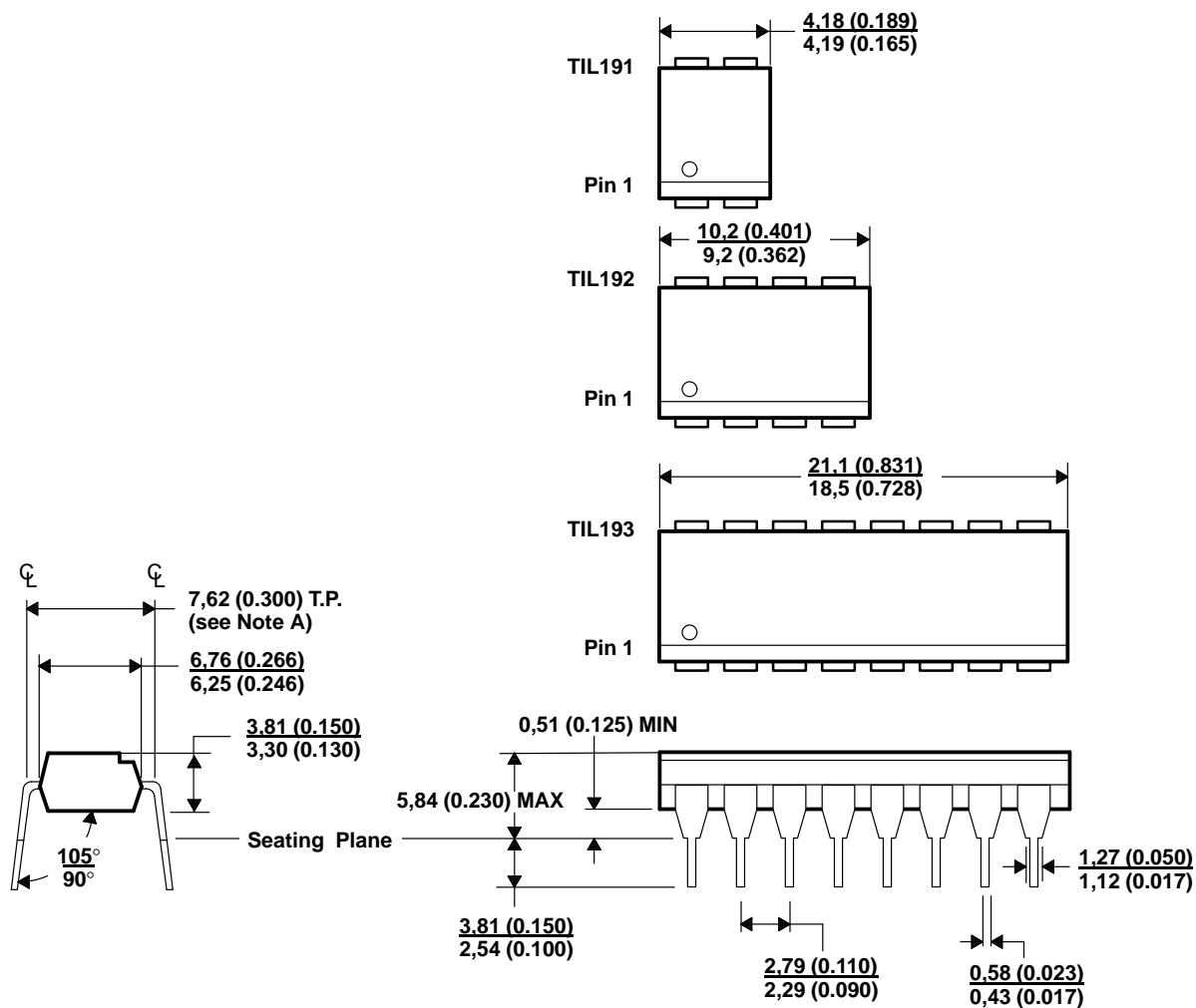


Figure 7

TIL191, TIL192, TIL193, TIL191A, TIL192A, TIL193A
 TIL191B, TIL192B, TIL193B
OPTOCOUPLEDERS

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MECHANICAL INFORMATION



- A. Each pin centerline is located within 0,25 (0.010) of its true longitudinal position.
- B. All linear dimensions are given in millimeters and parenthetically given in inches.

Figure 8. Mechanical Information

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