TIL197, TIL198, TIL199, TIL197A, TIL198A, TILI199A
TIL197B, TIL198B, TIL199B
SINGLE/DUAL/QUAD CHANNEL OPTOCOUPLERS/OPTOISOLATORS

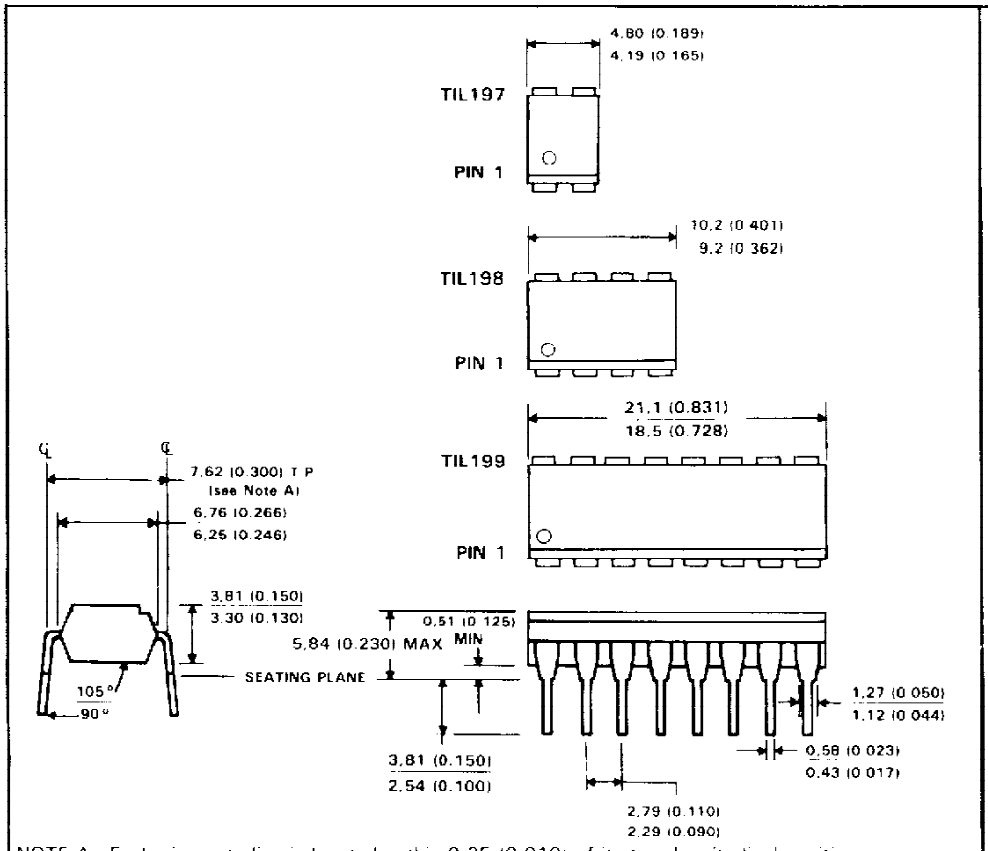
SOOS023 D3437, MAY 1990

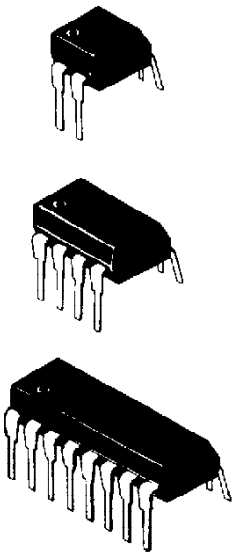
- Gallium-Arsenide Diode Infrared Source
- Source Is Optically Coupled to Silicon N-P-N Darlington Phototransistor
- Choice of One, Two or Four Channels
- Choice of Three Current-Transfer Ratios
- High-Voltage Electrical Isolation 3.535 kV Peak (2.5 kV rms)
- Plastic Dual-In-Line Packages
- UL Listed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





NOTE A: Each pin centerline is located within 0.25 (0.010) of its true longitudinal position.

ALL LINEAR DIMENSIONS ARE IN MILLIMETERS AND PARENTHETICALLY IN INCHES.

TEXAS INSTRUMENTS
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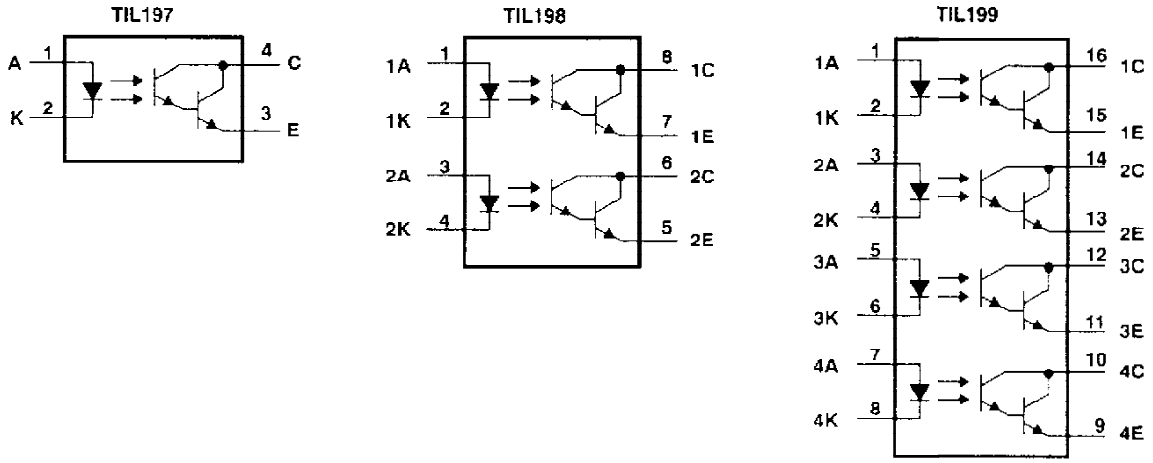
schematic diagrams



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)

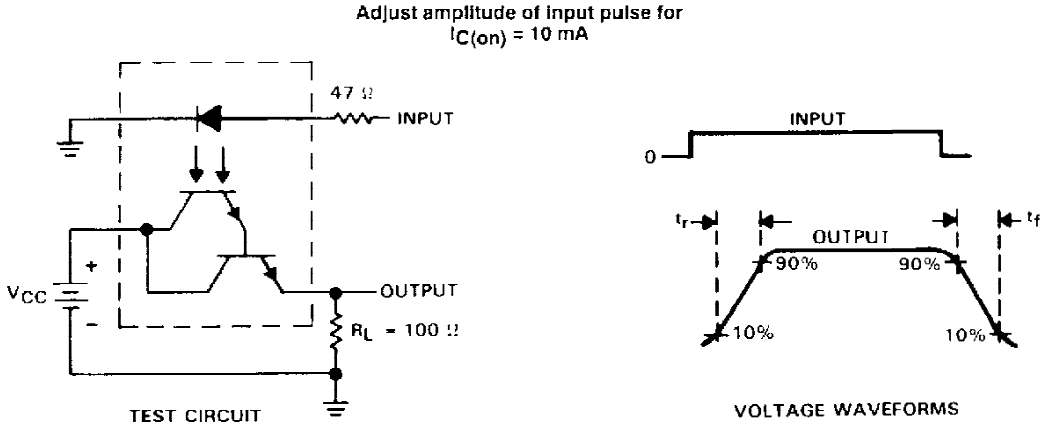
PARAMETER			TEST CONDITIONS		MIN	TYP	MAX	UNIT
$V_{(BR)CEO}$	Collector-emitter breakdown voltage		I_C = 0.5 mA,	I_F = 0	35			V
$V_{(BR)ECO}$	Emitter-collector breakdown voltage		I_C = 100 μA,	I_F = 0	7			V
I_R	Input diode static reverse current		V_R = 5 V				10	μA
$I_{C(off)}$	Off-state collector current		V_{CE} = 10 V,	I_F = 0			100	nA
CTR	Current transfer ratio	TIL197, TIL198, TIL199	I_F = 2 mA,	V_{CE} = 1 V	500%			
		TIL197A, TIL198A, TIL199A			1000%			
		TIL197B, TIL198B, TIL199B			1500%			
V_F	Input diode static forward voltage		I_F = 20 mA				1.4	V
$V_{CE(sat)}$	Collector-emitter saturation voltage		I_F = 10 mA,	I_C = 50 mA			1	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

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		TYP	UNIT
t_r	Rise time	V_{CC} = 10 V,	$I_{C(on)}$ = 10 mA,	100	μs
t_f	Fall time	R_L = 100 Ω,	See Figure 1	100	

PARAMETER MEASUREMENT INFORMATION



NOTES: A. The input waveform is supplied by a generator with the following characteristics: Z_O = 50 Ω, t_r ≤ 15 ns, duty cycle = 1%, t_W = 500 μs.
B. The output waveform is monitored on an oscilloscope with the following characteristics: t_r ≤ 12 ns, R_{in} > 1 MΩ, C_{in} < 20 pF.

Figure 1. Switching Times

TYPICAL CHARACTERISTICS

FORWARD CURRENT
vs
FORWARD VOLTAGE

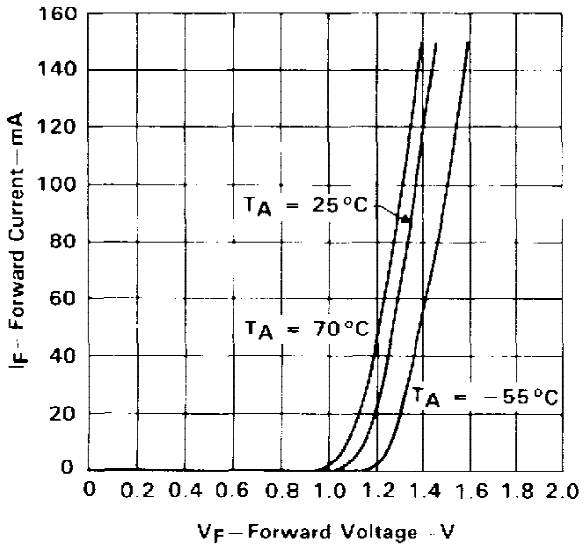


Figure 2

COLLECTOR CURRENT
vs
COLLECTOR EMITTER VOLTAGE

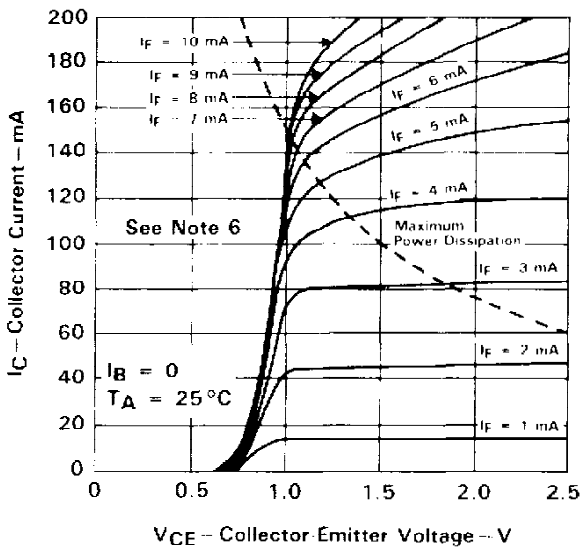


Figure 3

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

COLLECTOR CURRENT
vs
INPUT DIODE FORWARD CURRENT

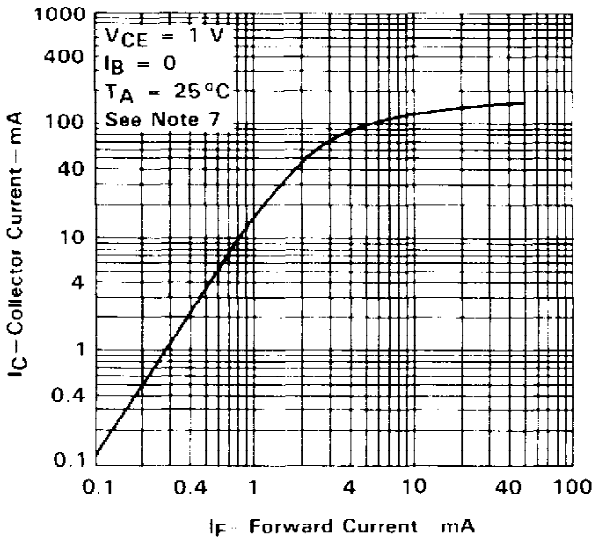


Figure 4

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

TYPICAL CHARACTERISTICS

RELATIVE ON-STATE COLLECTOR CURRENT
vs
FREE-AIR TEMPERATURE

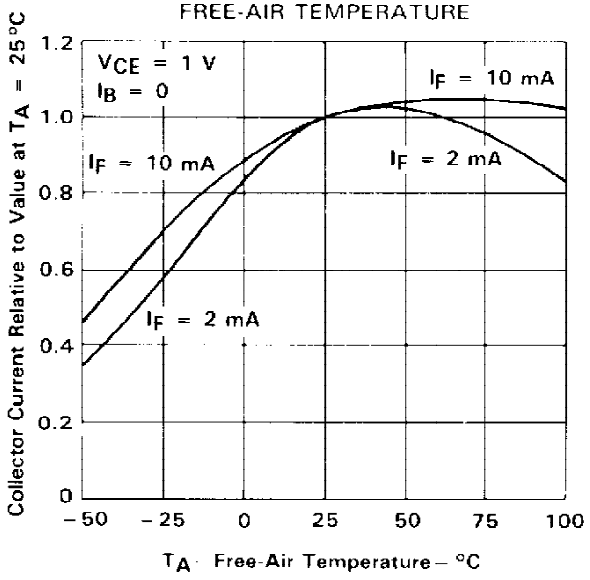


Figure 5

OFF STATE COLLECTOR CURRENT
vs
FREE AIR TEMPERATURE

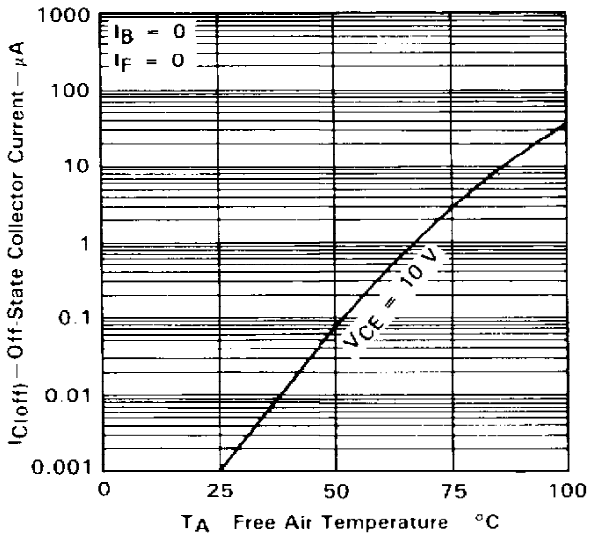


Figure 6

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PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)
TIL197	OBSOLETE	PDIP	N	4		TBD	Call TI	Call TI
TIL197A	OBSOLETE	PDIP	N	4		TBD	Call TI	Call TI
TIL197B	OBSOLETE	PDIP	N	4		TBD	Call TI	Call TI
TIL198	OBSOLETE	PDIP	N	8		TBD	Call TI	Call TI
TIL198A	OBSOLETE	PDIP	N	8		TBD	Call TI	Call TI
TIL198B	OBSOLETE	PDIP	N	8		TBD	Call TI	Call TI
TIL199	OBSOLETE	PDIP	N	16		TBD	Call TI	Call TI
TIL199A	OBSOLETE	PDIP	N	16		TBD	Call TI	Call TI
TIL199B	OBSOLETE	PDIP	N	16		TBD	Call TI	Call TI

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS) or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
TBD: The Pb-Free/Green conversion plan has not been defined.
Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.
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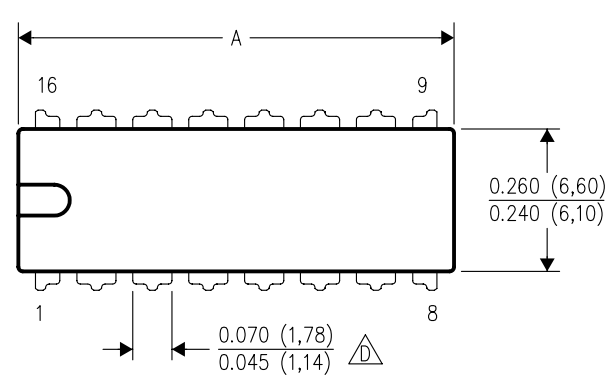
(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

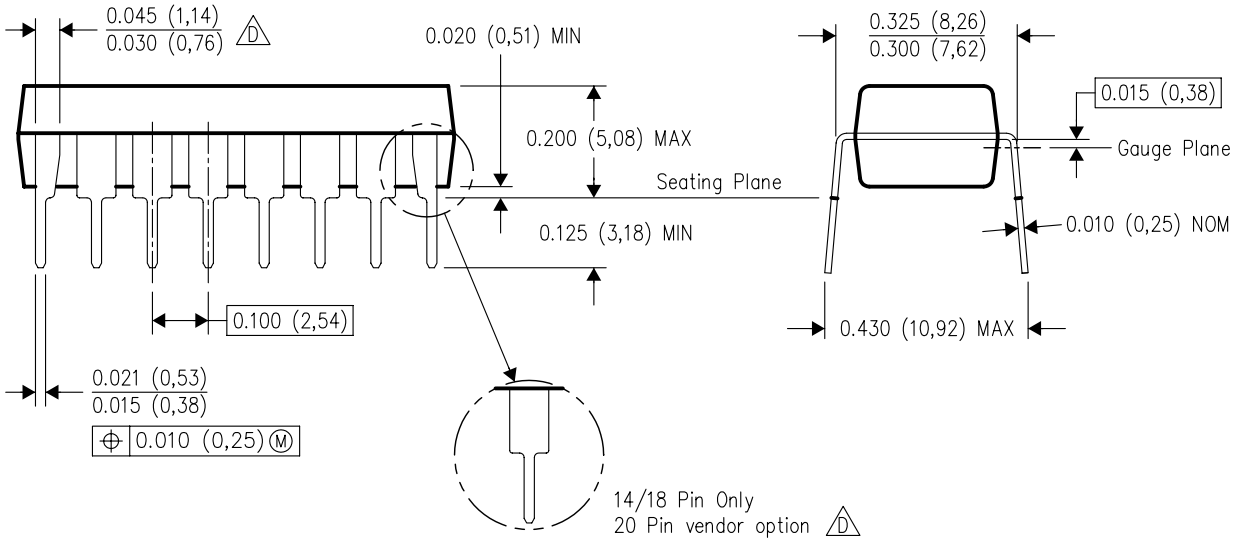
N (R–PDIP–T**)

PLASTIC DUAL–IN–LINE PACKAGE

16 PINS SHOWN



DIM \ PINS **	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS–001 VARIATION (C)	AA	BB	AC	AD



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NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Falls within JEDEC MS–001, except 18 and 20 pin minimum body length (Dim A).
D. The 20 pin end lead shoulder width is a vendor option, either half or full width.

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