

TIL923, TIL924, TIL925
TIL923A, TIL924A, TIL925A
SOOS031 – OCTOBER 1991

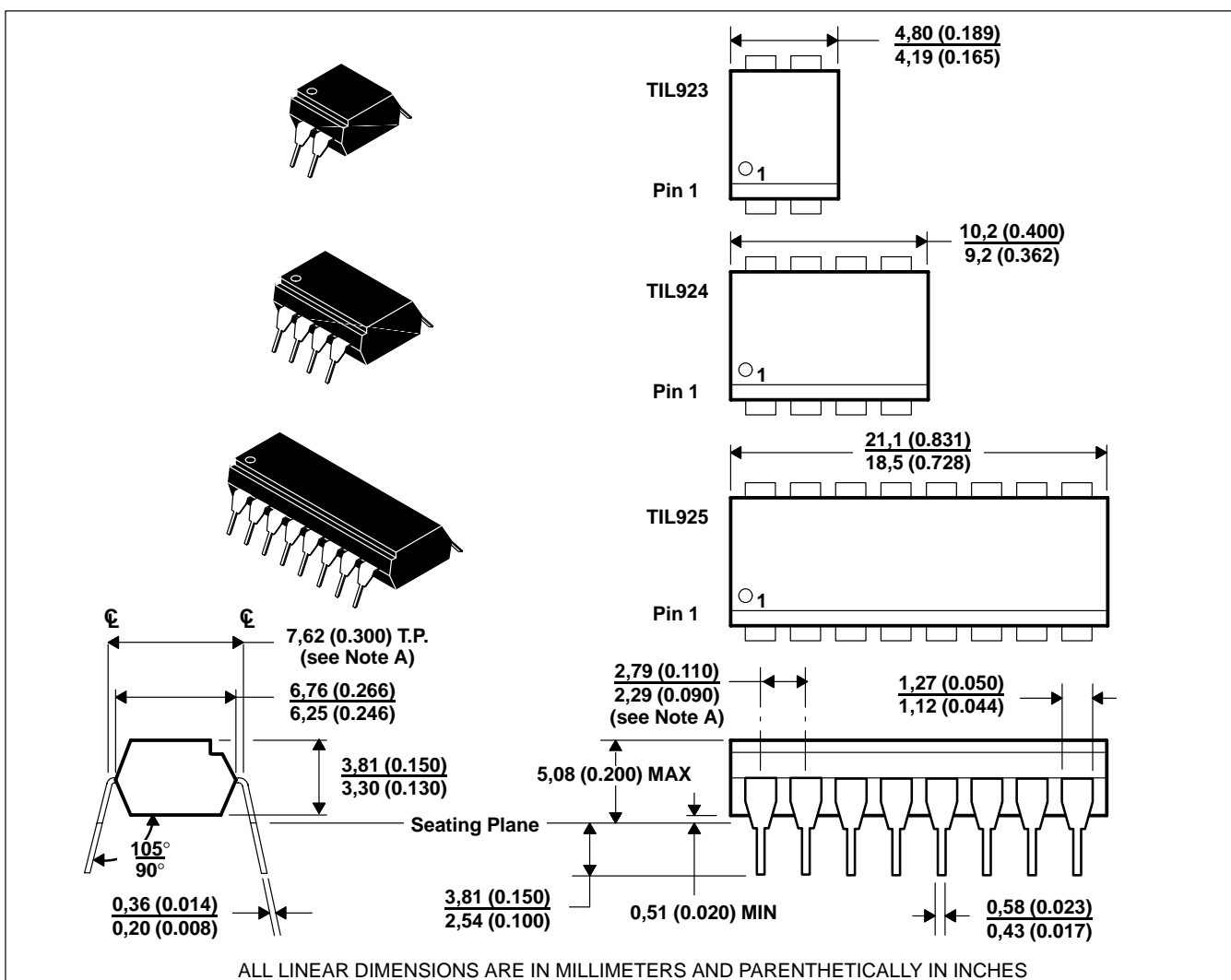
SINGLE/DUAL/QUAD CHANNEL OPTOCOUPLEDERS/OPTOISOLATORS

- 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 Two 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 a gallium-arsenide light-emitting diode and a silicon n-p-n Darlington phototransistor per channel. The TIL923 has one channel in a 4-pin package, the TIL924 has two channels in a 8-pin package, and the TIL925 has four channels in a 16-pin package. The standard devices, TIL923, TIL924, and TIL925, are tested for a current-transfer ratio of 500% minimum. Devices selected for a current-transfer ratio of 1000% are designated with the suffix.

mechanical data



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.



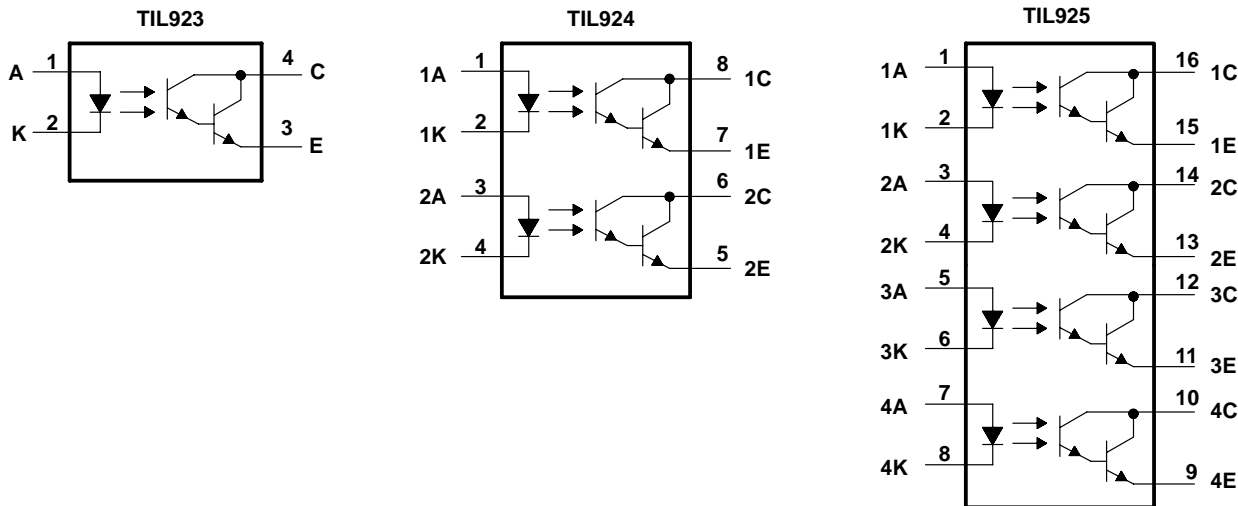
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schematic diagrams



absolute maximum ratings at 25°C free-air temperature (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 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
- Operating free-air temperature, 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 _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	TIL923, TIL924, TIL925	500%			
		TIL923A, TIL924A, TIL925A	1000%			
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.



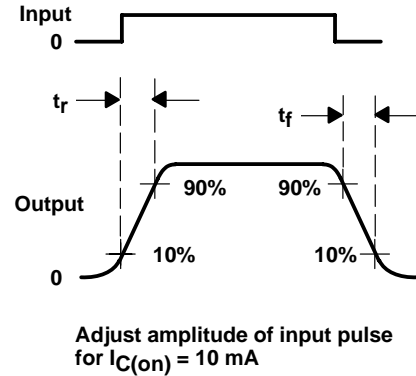
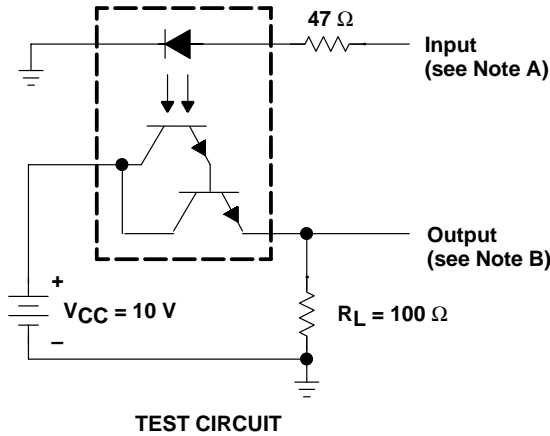
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switching characteristics at 25°C free-air temperature

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

PARAMETER MEASUREMENT INFORMATION



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

Figure 1. Switching Times

TYPICAL CHARACTERISTICS

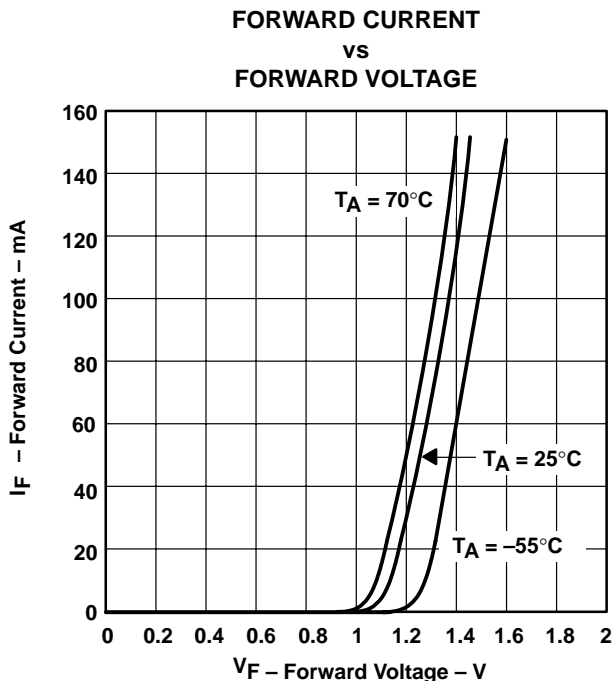
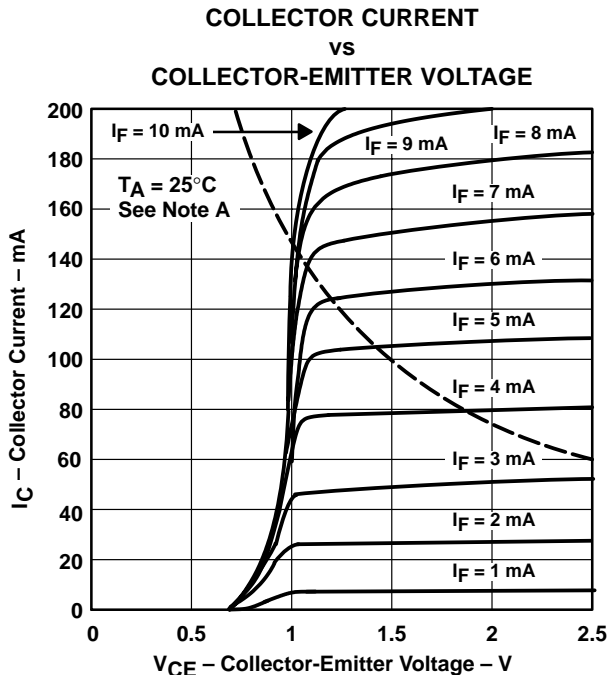
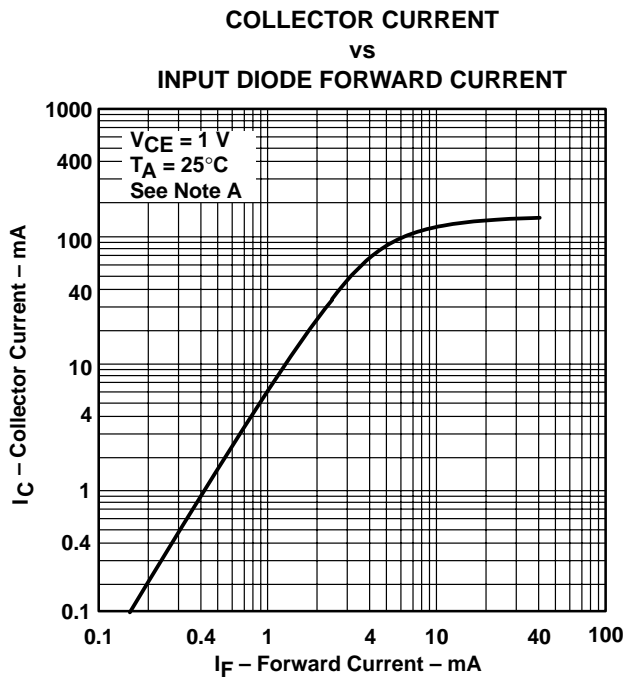


Figure 2



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

Figure 3



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

Figure 4

TYPICAL CHARACTERISTICS

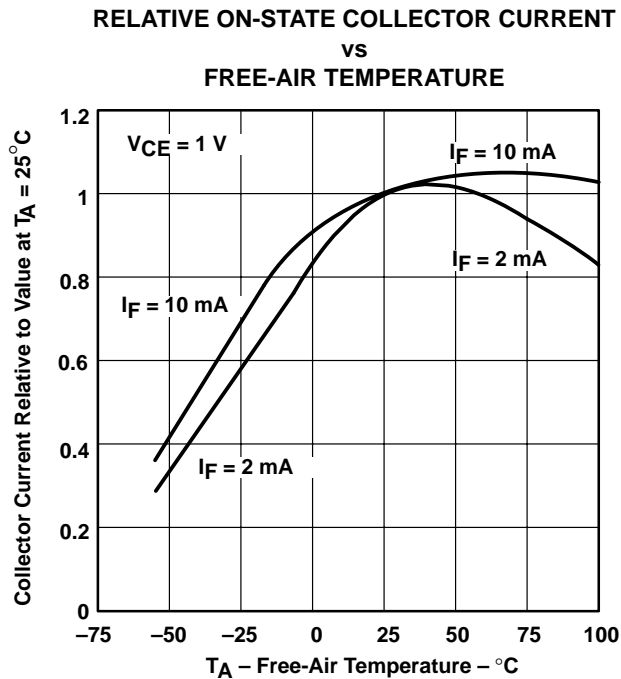


Figure 5

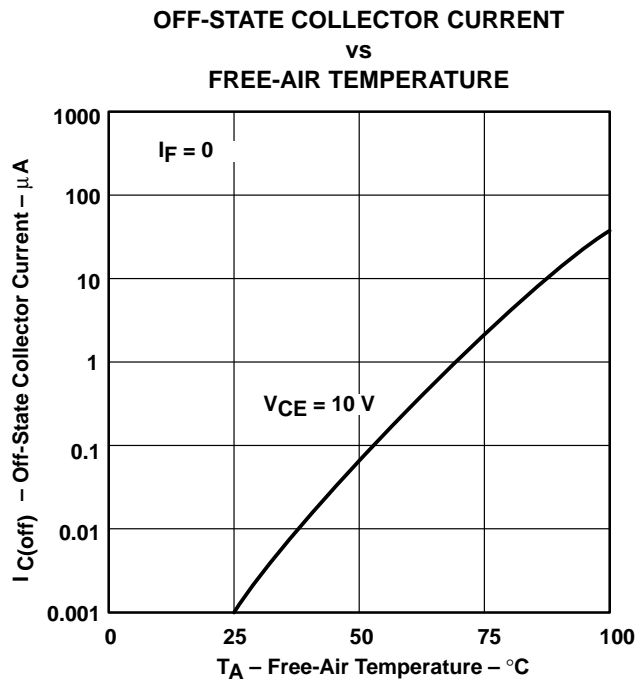


Figure 6

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
TIL923	OBSOLETE	PDIP	P	8		TBD	Call TI	Call TI
TIL923A	OBSOLETE	PDIP	P	8		TBD	Call TI	Call TI
TIL924	OBSOLETE	PDIP	P	8		TBD	Call TI	Call TI
TIL924A	OBSOLETE	PDIP	P	8		TBD	Call TI	Call TI
TIL925	OBSOLETE	PDIP	P	8		TBD	Call TI	Call TI
TIL925A	OBSOLETE	PDIP	P	8		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.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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P (R-PDIP-T8)

PLASTIC DUAL-IN-LINE PACKAGE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. Falls within JEDEC MS-001 variation BA.

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