

TIL181 OPTOCOUPLER

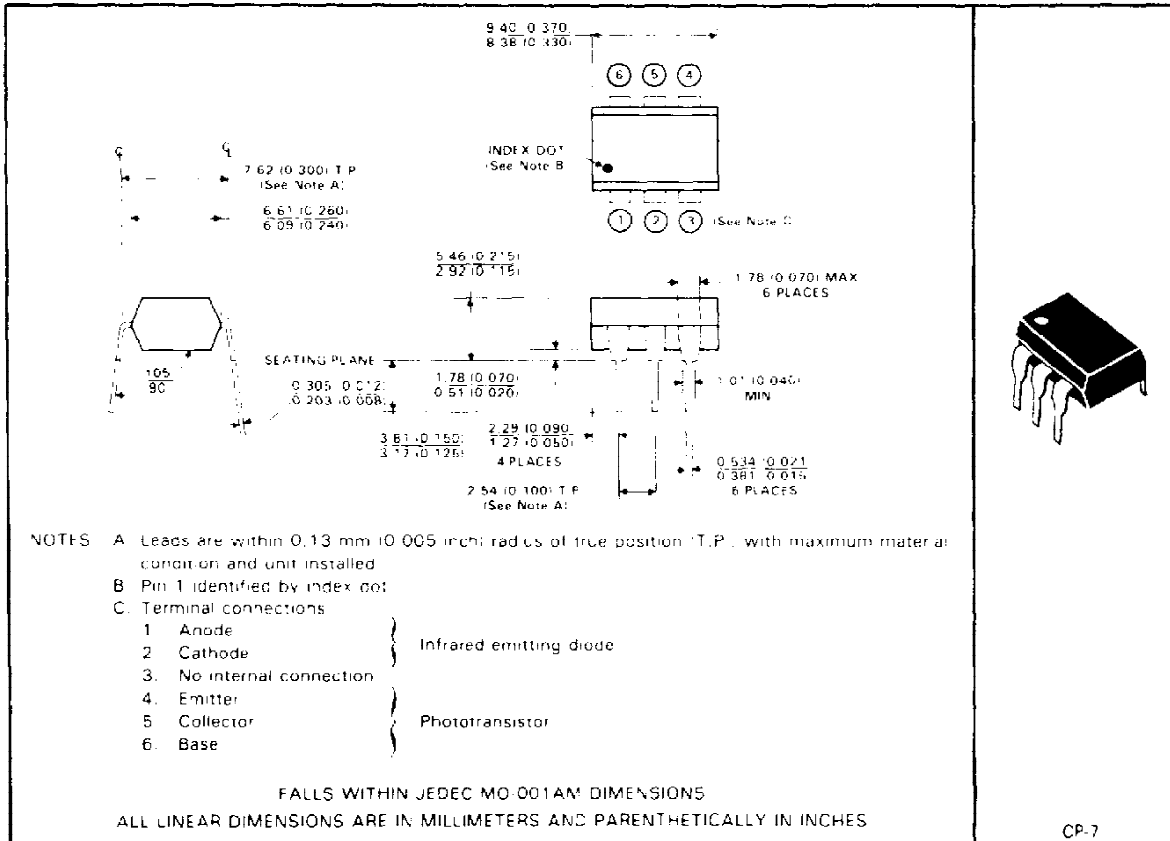
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COMPATIBLE WITH STANDARD TTL INTEGRATED CIRCUITS

- Gallium Arsenide Diode Infrared Source Optically Coupled to a Silicon N-P-N Phototransistor
- High Direct-Current Transfer Ratio
- High-Voltage Electrical Isolation . . . 2.5 kV rms (3.535 kV peak)
- Plastic Dual-In-Line Package
- High-Speed Switching: $t_r = 2 \mu s$ Typ, $t_f = 2 \mu s$ Typ
- UL Recognized — File #E65085
- Primarily Used with Telephone Ring Detector TCM1520A and Tone Drivers TCM1501B, TCM1506B, TCM1512B, TCM1531, TCM1532, TCM1536, and TCM1539

mechanical data

The package consists of a gallium arsenide infrared-emitting diode and an n-p-n silicon phototransistor mounted on a 6-pin lead frame encapsulated within an electrically nonconductive plastic compound. The case will withstand soldering temperature with no deformation and device performance characteristics remain stable when operated in high-humidity conditions. Unit weight is approximately 0.52 grams.



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

Input-to-output voltage	±2.5 kV rms (±3.535 kV peak)
Collector-base voltage	70 V
Collector-emitter voltage (see Note 1)	30 V
Emitter-collector voltage	7 V
Emitter-base voltage	7 V
Input-diode reverse voltage	3 V
Input diode continuous forward current at (or below) 25°C free-air temperature (see Note 2)	100 mA
Continuous power dissipation at (or below) 25°C free-air temperature	
Infrared-emitting diode (see Note 3)	150 mW
Phototransistor (see Note 4)	150 mW
Total, infrared-emitting diode plus phototransistor (see Note 5)	250 mW
Storage temperature range	-55°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260°C

- NOTES: 1. This value applies when the base-emitter diode is open-circuited.
 2. Derate linearly to 100°C free-air temperature at the rate of 1.33 mA/°C.
 3. Derate linearly to 100°C free air temperature at the rate of 2 mW/°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 3.33 mW/°C.

electrical characteristics at 25°C free-air temperature

PARAMETER		TEST CONDITIONS			MIN	TYP	MAX	UNIT	
$V_{BR,CBO}$	Collector base breakdown voltage	$I_C = 10 \mu A$	$I_E = 0$	$I_F = 0$	70			V	
$V_{BR,CEO}$	Collector emitter breakdown voltage	$I_C = 1 \text{ mA}$	$I_B = 0$	$I_F = 0$	30			V	
$V_{BR,EBO}$	Emitter base breakdown voltage	$I_E = 10 \mu A$	$I_C = 0$	$I_F = 0$	7			V	
I_R	Input diode static reverse current	$V_R = 3 \text{ V}$					10	μA	
$I_{C(on)}$	On state collector current	Phototransistor operation	$V_{CE} = 0.4 \text{ V}$	$I_F = 0.8 \text{ mA}$	$I_B = 0$	100		μA	
		Photodiode operation	$V_{CB} = 0.4 \text{ V}$	$I_F = 16 \text{ mA}$	$I_E = 0$	5		20	μA
$I_{C(off)}$	Off state collector current	Phototransistor operation	$V_{CE} = 10 \text{ V}$	$I_F = 0$	$I_B = 0$		1	50	nA
		Photodiode operation	$V_{CB} = 10 \text{ V}$	$I_F = 0$	$I_E = 0$		0.1	20	nA
h_{FE}	Transistor static forward current transfer ratio	$V_{CE} = 5 \text{ V}$	$I_C = 10 \text{ mA}$	$I_F = 0$	200	550			
V_F	Input diode static forward voltage	$I_F = 16 \text{ mA}$				1.2	1.4	V	
$V_{CE(sat)}$	Collector emitter saturation voltage	$I_C = 5 \text{ mA}$	$I_F = 10 \text{ mA}$	$I_B = 0$		0.25	0.4	V	
R_O	Input to output internal resistance	$V_{in,out} = \pm 500 \text{ V}$	See Note 6		10^{11}			Ω	
C_{IO}	Input to output capacitance	$V_{in,out} = 0$	$f = 1 \text{ MHz}$	See Note 6		1	1.3	pF	

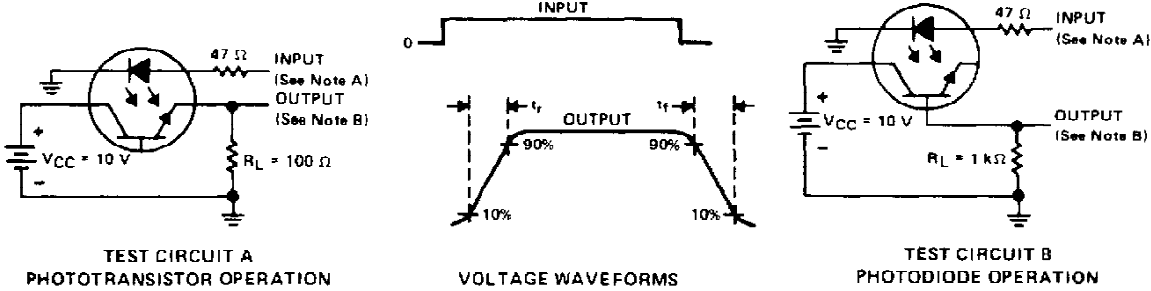
NOTE 6: These parameters are measured between both input diode leads shorted together and all the phototransistor leads shorted together.

switching characteristics at 25°C free-air temperature

PARAMETER		TEST CONDITIONS			MIN	TYP	MAX	UNIT	
t_r	Rise time	Phototransistor operation	$V_{CC} = 10 \text{ V}$	$I_{C(on)} = 2 \text{ mA}$	$R_L = 100 \Omega$		2	10	μs
t_f	Fall time		See Test Circuit A of Figure 1				2	10	μs
t_r	Rise time	Photodiode operation	$V_{CC} = 10 \text{ V}$	$I_{C(on)} = 20 \mu A$	$R_L = 1 \text{ k}\Omega$		1		μs
t_f	Fall time		See Test Circuit B of Figure 1				1		μs

PARAMETER MEASUREMENT INFORMATION

Adjust amplitude of input pulse for
 $I_{C(on)} = 2 \text{ mA}$ (Test Circuit A) or
 $I_{C(on)} = 20 \mu\text{A}$ (Test Circuit B)



NOTES: A. The input waveform is supplied by a generator with the following characteristics: $Z_{OUT} = 50 \Omega$, $t_r \leq 15 \text{ ns}$, duty cycle = 1%, $t_w = 100 \mu\text{s}$
 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

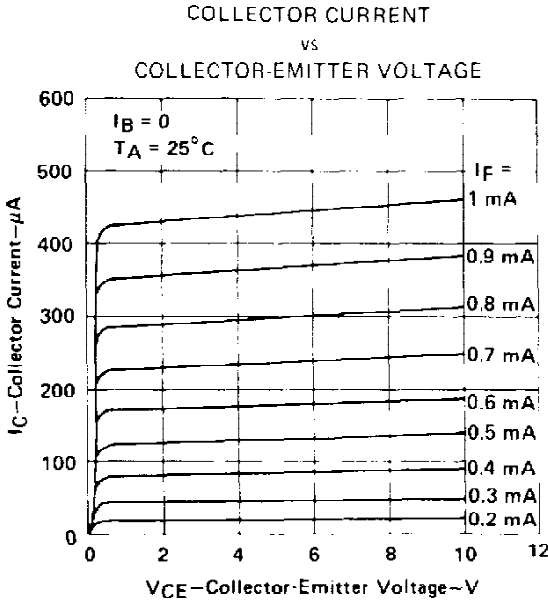


FIGURE 2

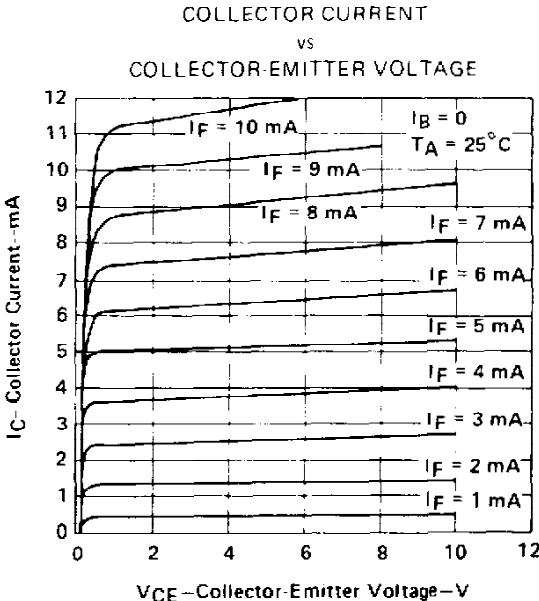


FIGURE 3

TYPICAL CHARACTERISTICS

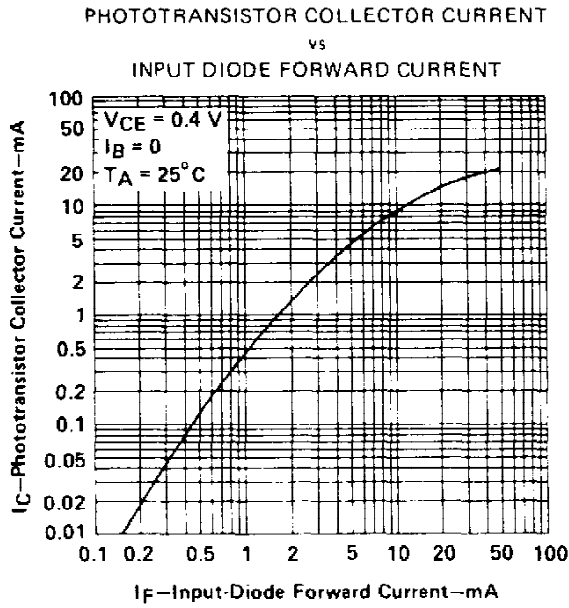


FIGURE 4

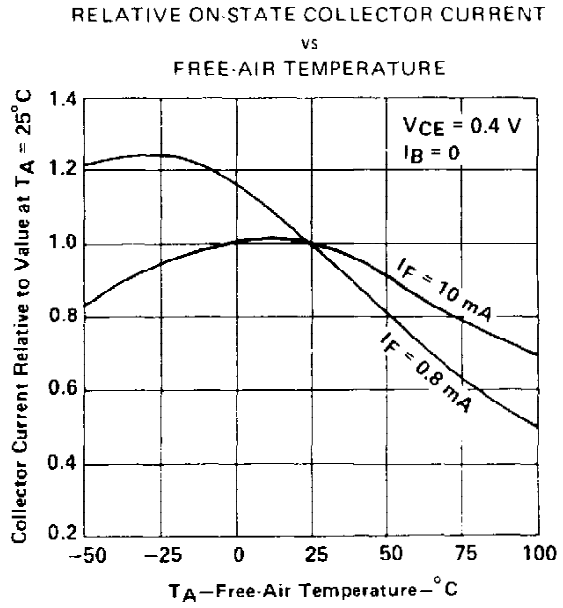


FIGURE 5

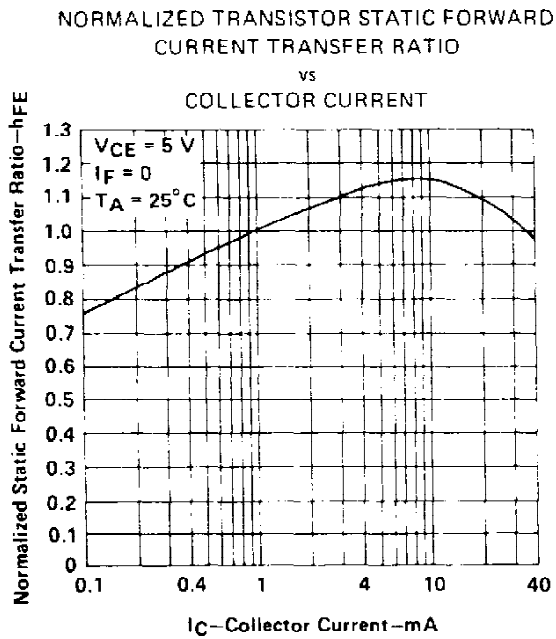


FIGURE 6

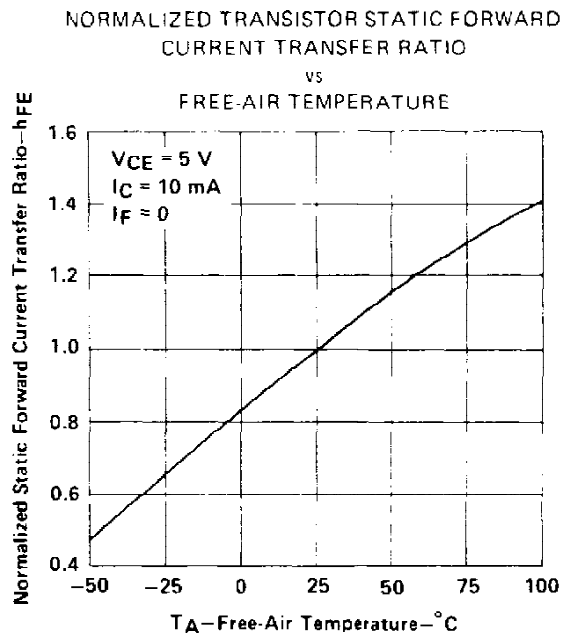


FIGURE 7

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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⁾
TIL181	OBSOLETE	PDIP	N	6		TBD	Call TI	Call TI

⁽¹⁾ The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

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

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