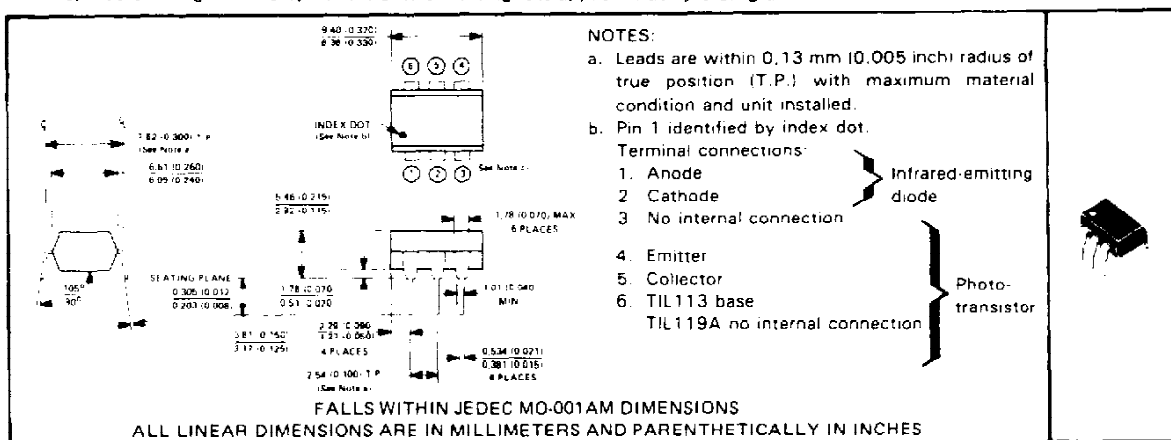


SOOS042A D1499, AUGUST 1981—REVISED JUNE 1989

- mechanical data**

The package consists of a gallium arsenide infrared-emitting diode and an n-p-n silicon darlington-connected phototransistor mounted on a 6-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.



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

Input-to-Output Voltage	±1.5 kV
Collector-Base Voltage (TIL113)	30 V
Collector-Emitter Voltage (See Note 1)	30 V
Emitter-Collector Voltage	7 V
Emitter-Base Voltage (TIL113)	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.

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TIL113, TIL119A OPTOCOUPERS

electrical characteristics at 25°C free-air temperature

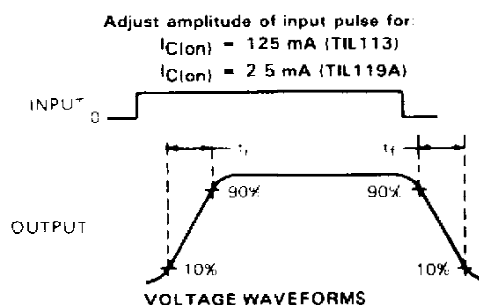
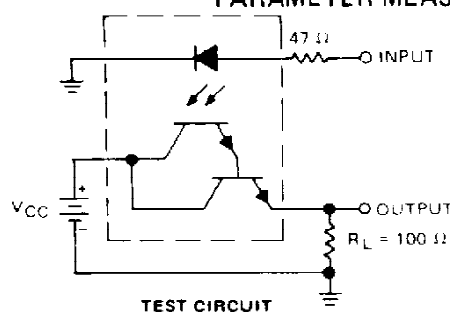
PARAMETER	TEST CONDITIONS†	TIL113			TIL119A			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	
$V_{(BR)CBO}$ Collector-Base Breakdown Voltage	$I_C = 10 \mu A$, $I_E = 0$, $I_F = 0$	30						V
$V_{(BR)CEO}$ Collector-Emitter Breakdown Voltage	$I_C = 1 \text{ mA}$, $I_B = 0$, $I_F = 0$	30			30			V
$V_{(BR)EBO}$ Emitter-Base Breakdown Voltage	$I_E = 10 \mu A$, $I_C = 0$, $I_F = 0$	7						V
$V_{(BR)ECO}$ Emitter-Collector Breakdown Voltage	$I_E = 10 \mu A$, $I_F = 0$				7			V
$I_{C(on)}$ On State Collector Current	$V_{CE} = 1 \text{ V}$, $I_B = 0$, $I_F = 10 \text{ mA}$	30	100					mA
	$V_{CE} = 1 \text{ V}$, $I_F = 10 \text{ mA}$				30	160		
$I_{C(off)}$ Off-State Collector Current	$V_{CE} = 10 \text{ V}$, $I_B = 0$, $I_F = 0$			100			100	nA
β_{FE} Transistor Static Forward Current Transfer Ratio	$V_{CE} = 1 \text{ V}$, $I_C = 10 \text{ mA}$, $I_F = 0$		15,000					
V_F Input Diode Static Forward Voltage	$I_F = 10 \text{ mA}$			1.5			1.5	V
$V_{CE(sat)}$ Collector-Emitter Saturation Voltage	$I_C = 125 \text{ mA}$, $I_B = 0$, $I_F = 50 \text{ mA}$			1.2				V
	$I_C = 30 \text{ mA}$, $I_F = 10 \text{ mA}$						1	
r_{IO} Input-to-Output Internal Resistance	$V_{in-out} = \pm 1.5 \text{ kV}$. See Note 6	10 ¹¹			10 ¹¹			Ω
C_{io} Input-to-Output Capacitance	$V_{in-out} = 0$, $f = 1 \text{ MHz}$. See Note 6		1	1.3		1	1.3	pF

NOTE 6: These parameters are measured between both input-diode leads shorted together and all the phototransistor leads shorted together. *Reference to the base are not applicable to TIL119A.

switching characteristics at 25°C free-air temperature

PARAMETER	TEST CONDITIONS	TIL113			TIL119A			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	
t_r Rise Time	$V_{CC} = 15 \text{ V}$, $I_{C(on)} = 125 \text{ mA}$, $R_L = 100 \Omega$, See Figure 1		300					μs
t_f Fall Time			300					
t_r Rise Time	$V_{CC} = 10 \text{ V}$, $I_{C(on)} = 2.5 \text{ mA}$, $R_L = 100 \Omega$, See Figure 1					300		μs
t_f Fall Time						300		

PARAMETER MEASUREMENT INFORMATION



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

FIGURE 1—SWITCHING TIMES

TYPICAL CHARACTERISTICS

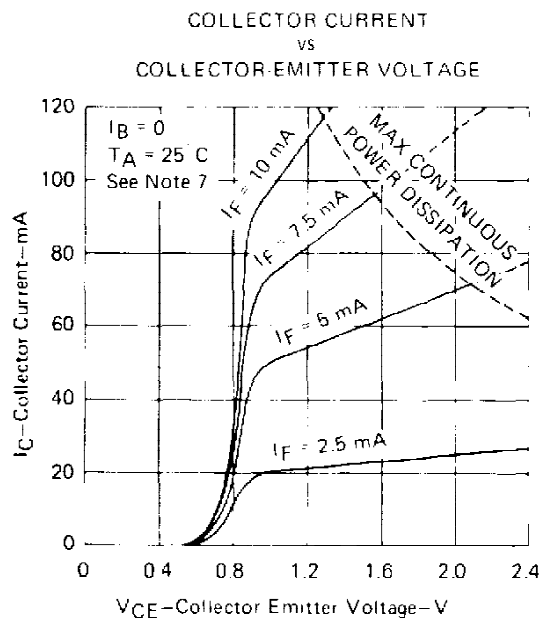


FIGURE 2

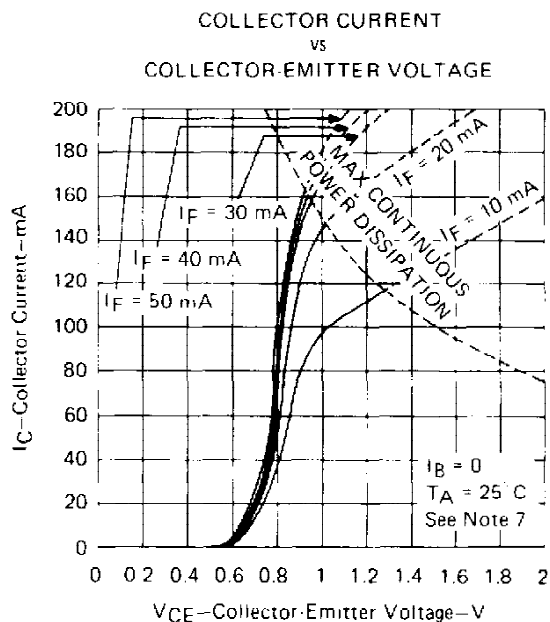


FIGURE 3

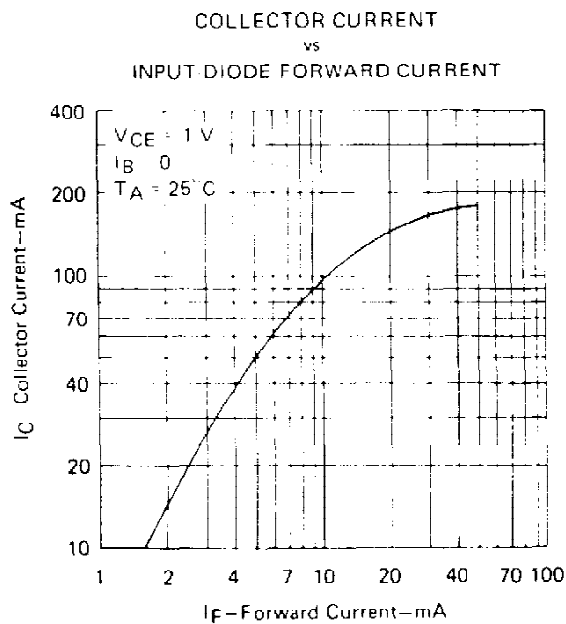


FIGURE 4

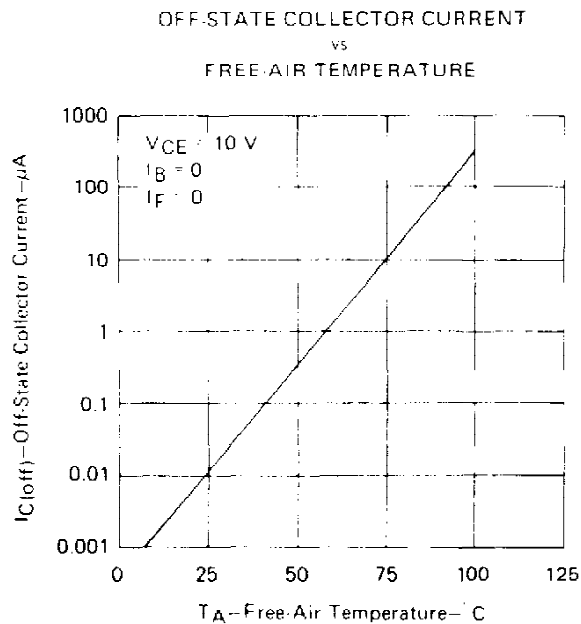


FIGURE 5

NOTE 7: Pulse operation of input diode is required for operation beyond limits shown by dotted line.

**TIL113, TIL119A
OPTOCOUPERS**

TYPICAL CHARACTERISTICS

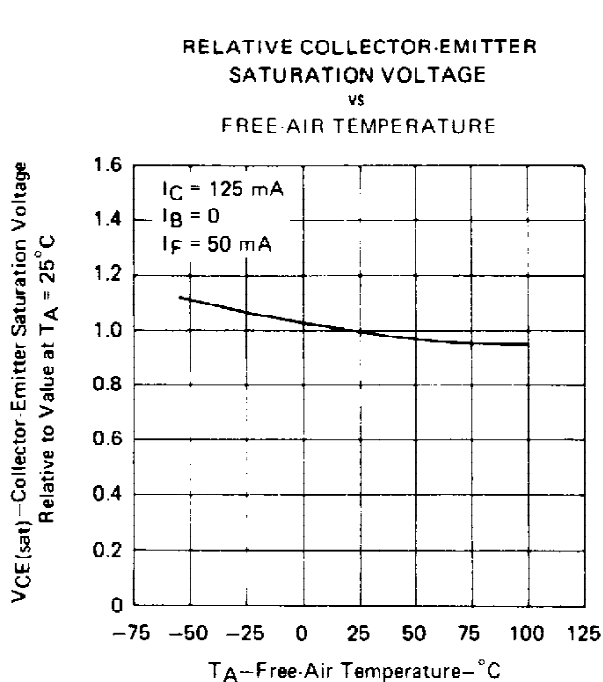


FIGURE 6

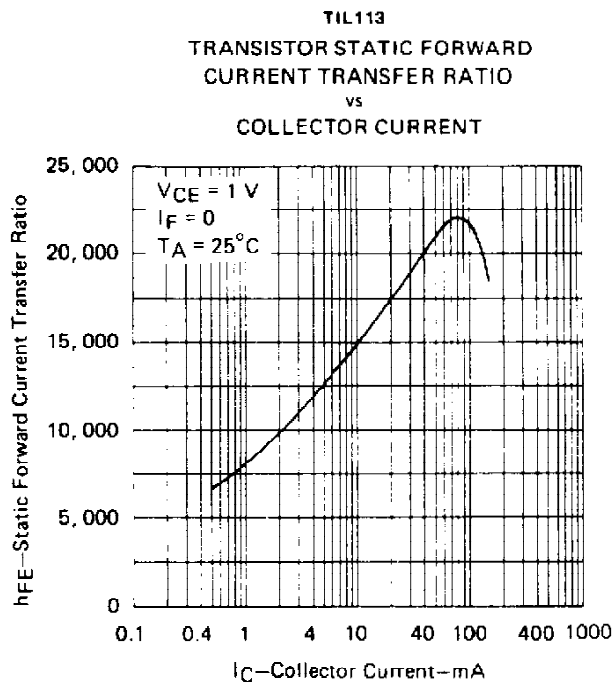


FIGURE 7

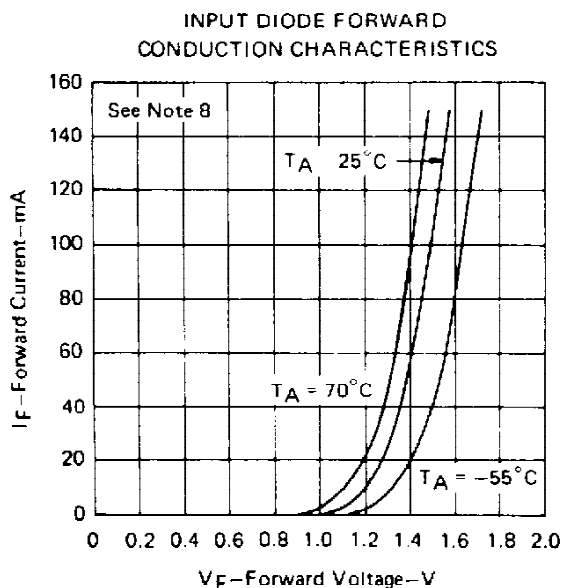


FIGURE 8

NOTE 8: This parameter was measured using pulse techniques. $t_w = 1\text{ ms}$, duty cycle $\leq 2\%$.

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