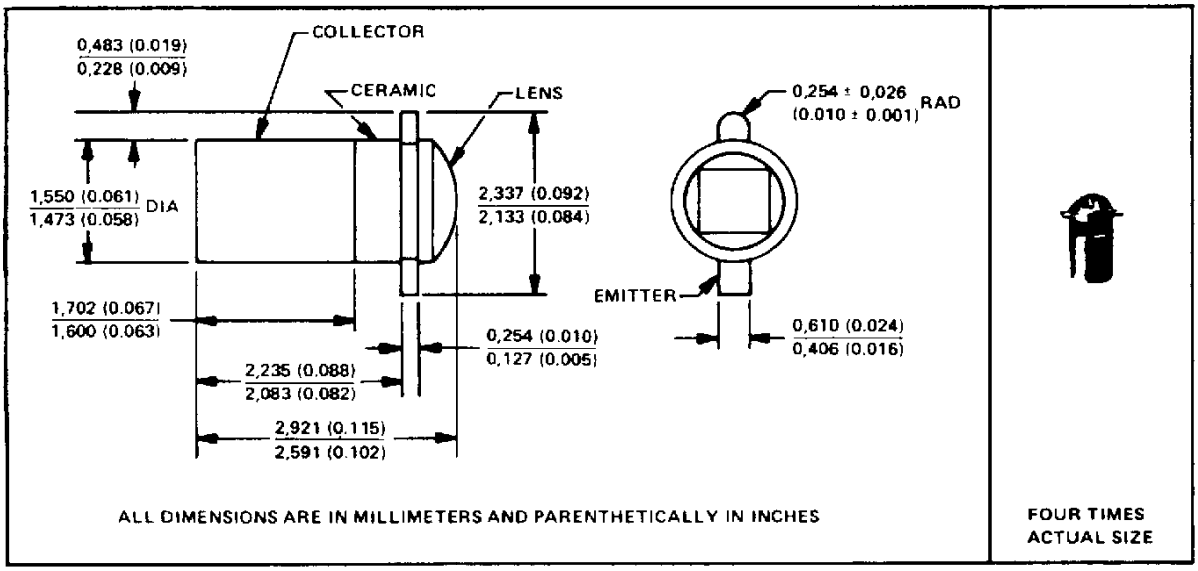
TIL601 THRU TIL604, LS600, LS602, LS611 THRU LS619
N-P-N PLANAR SILICON PHOTOTRANSISTORS

SODS026A D1971, NOVEMBER 1974—REVISED SEPTEMBER 1989

DESIGNED FOR HIGH-DENSITY READ OUT

- Hermetically-Sealed Pill Package
- Recommended for Application in Character Recognition, Tape and Card Readers, Velocity Indicators, and Encoders
- Unique Package Design Allows for Assembly into Printed Circuit Boards
- Spectrally and Mechanically Compatible with TIL23 thru TIL25
- Saturation Level Directly Compatible with Most TTL
- TIL604HR2† Includes High-Reliability Processing and Lot Acceptance (See TIL604HR2 for Summary of Processing)

mechanical data



†All electrical and mechanical specifications for the TIL24 also apply for TIL24HR2

TEXAS INSTRUMENTS
POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

absolute maximum ratings at 25°C case temperature (unless otherwise noted)

Collector-emitter voltage . . . . . 50 V
Emitter-collector voltage . . . . . 7 V
Continuous device dissipation at (or below) 25°C case temperature (see Note 1) . . . . . 50 mW
Operating case temperature range . . . . . −65°C to 125°C
Storage temperature range . . . . . −65°C to 150°C
Soldering temperature (10 seconds) . . . . . 240°C

electrical characteristics at 25°C case temperature (unless otherwise noted)

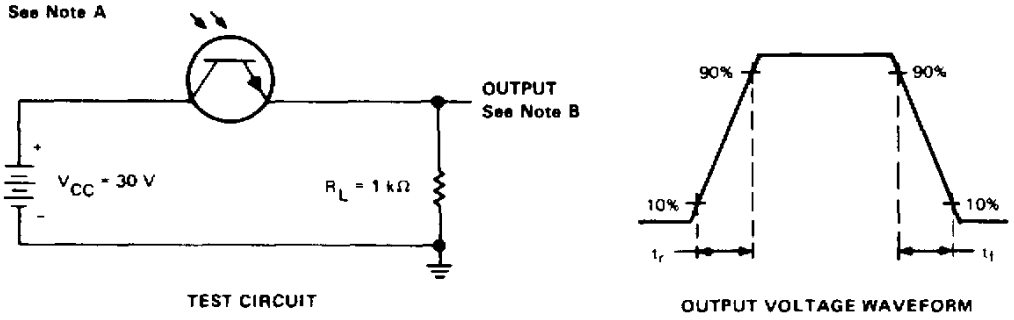
PARAMETER		TEST CONDITIONS	TYPE	MIN	TYP	MAX	UNIT
$V_{(BR)CEO}$	Collector-emitter breakdown voltage	I_C = 100 μA, E_e = 0	All	50			V
$V_{(BR)ECO}$	Emitter-collector breakdown voltage	I_E = 100 μA, E_e = 0	All	7			V
I_D	Dark current	V_{CE} = 30 V, E_e = 0	All			25	nA
		V_{CE} = 30 V, E_e = 0, T_C = 100°C	All		3		μA
I_L	Light current	V_{CE} = 5 V, E_e = 20 mW/cm², See Note 2	TIL601	0.5		3	mA
			TIL602	2		5	
			TIL603	4		8	
			TIL604	7			
			LS600	0.8			
			LS602	0.5			
			LS611	0.5	1	2	
			LS612	1	2	3	
			LS613	2	3	4	
			LS614	3	4	5	
			LS615	4	5	6	
			LS616	5	6	7	
			LS617	6	7	8	
			LS618	7	8	9	
			LS619	8	9		
$V_{CE(sat)}$	Collector-emitter saturation voltage	I_C = 0.4 mA, E_e = 20 mW/cm², See Note 2	All		0.15		V

NOTES: 1. Derate linearly to 125°C at the rate of 0.5 mW/°C.
2. Irradiance (E_e) is the radiant power per unit area incident upon a surface. For this measurement, the source is an unfiltered tungsten linear-filament lamp operating at a color temperature of 2870 K.

switching characteristics at 25°C case temperature

PARAMETER		TEST CONDITIONS	TYP	UNIT
t_r	Rise time	V_{CC} = 30 V, I_L = 800 μA, R_L = 1 kΩ, See Figure 1	8	μs
t_f	Fall time		6	

PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT

OUTPUT VOLTAGE WAVEFORM

NOTES: A. Input irradiance is supplied by a pulsed gallium arsenide infrared emitter with rise and fall times of less than 50 ns. Incident irradiation is adjusted for I_L = 800 μA.
B. Output waveform is monitored on an oscilloscope with the following characteristics: $t_r \leq 25$ ns, $R_{in} \geq 1$ MΩ, $C_{in} \leq 20$ pF.

FIGURE 1

TYPICAL APPLICATION DATA

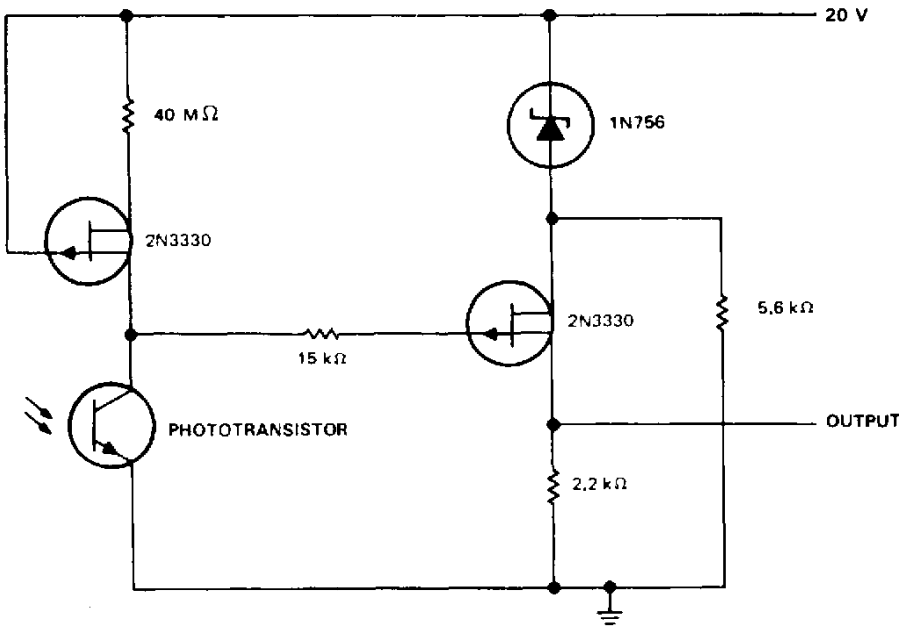


FIGURE 2. LOW-LEVEL DETECTOR AND PREAMPLIFIER

TYPICAL APPLCIATION DATA

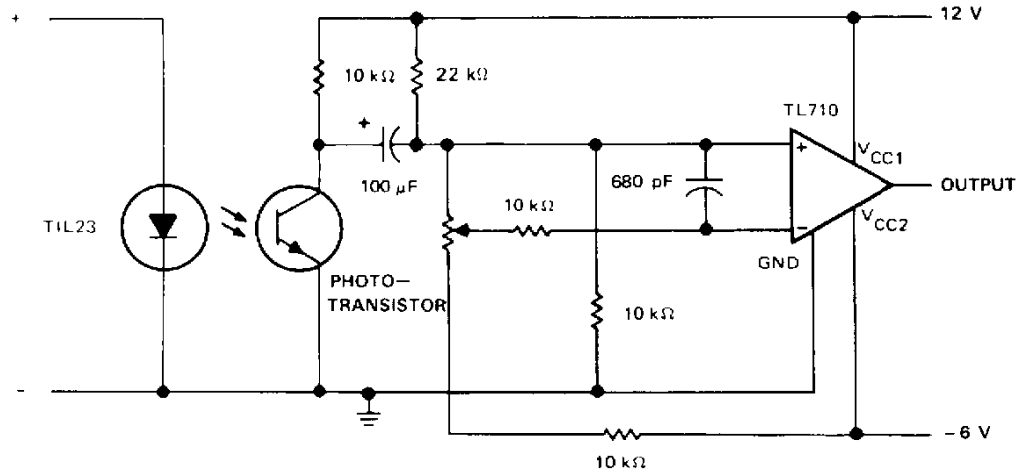


FIGURE 3. OPTICALLY COUPLED AMPLIFIER

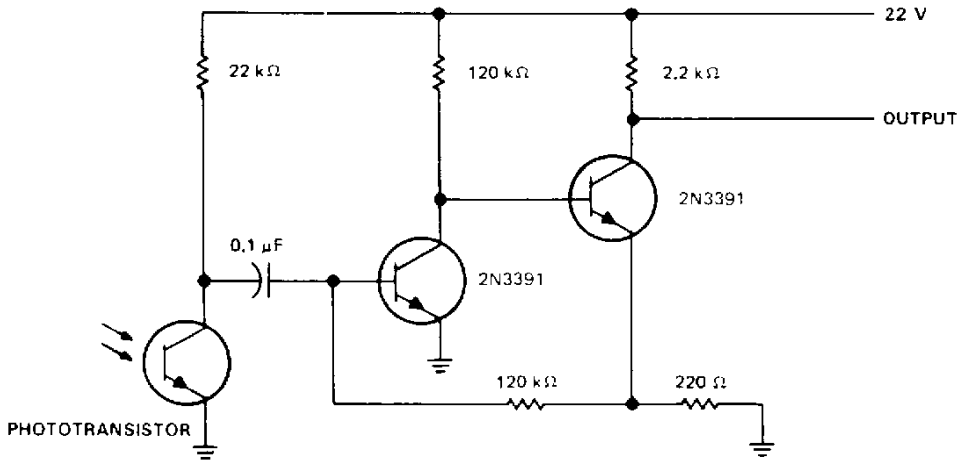


FIGURE 4. LIGHT PULSE DETECTOR

TYPICAL CHARACTERISTICS

COLLECTOR CURRENT
vs
COLLECTOR-EMITTER VOLTAGE

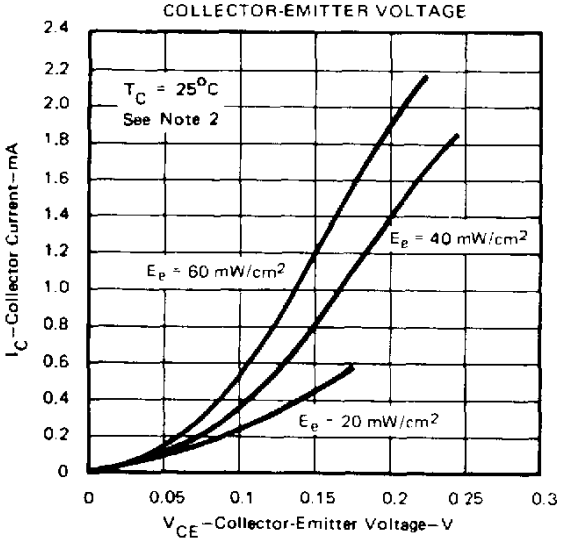


FIGURE 5

COLLECTOR CURRENT
vs
COLLECTOR-EMITTER VOLTAGE

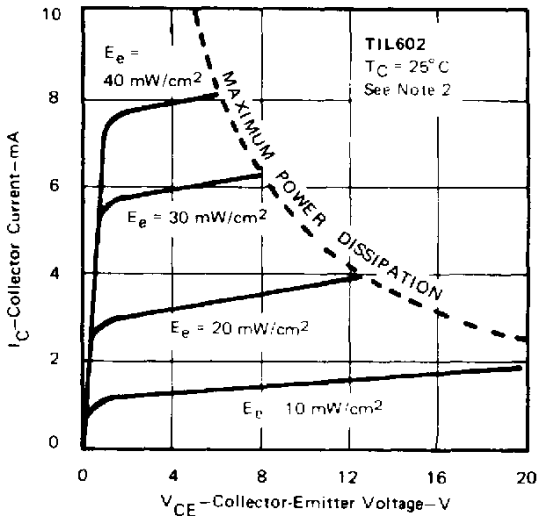


FIGURE 6

COLLECTOR-EMITTER SATURATION VOLTAGE
vs
IRRADIANCE

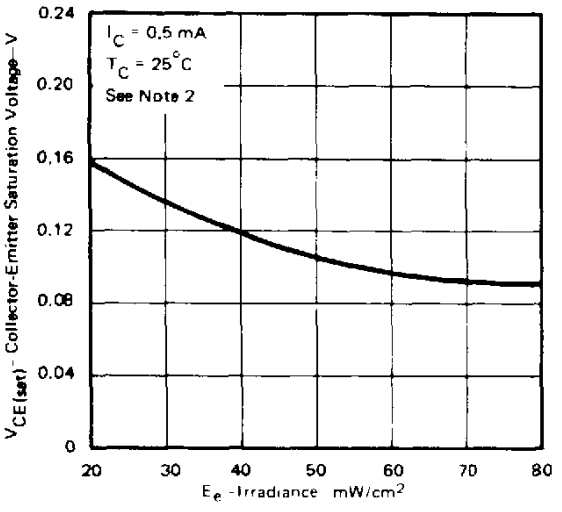


FIGURE 7

COLLECTOR CURRENT
vs
IRRADIANCE

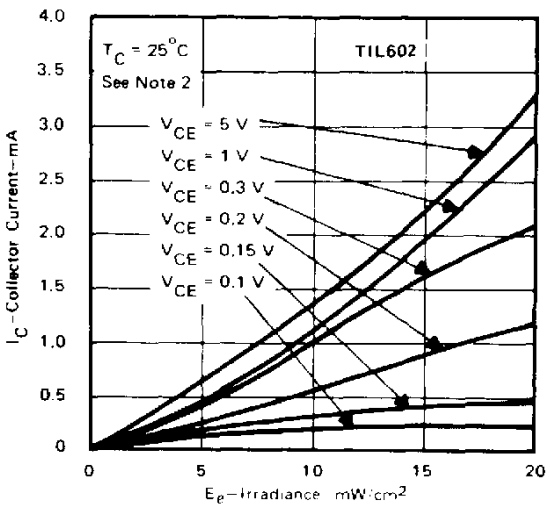


FIGURE 8

NOTE 2. Irradiance (E_e) is the radiant power unit area incident upon a surface. For this measurement, the source is an unfiltered tungsten linear-filament lamp operating at a color temperature of 2870 K.

TYPICAL CHARACTERISTICS

DARK CURRENT
vs
CASE TEMPERATURE

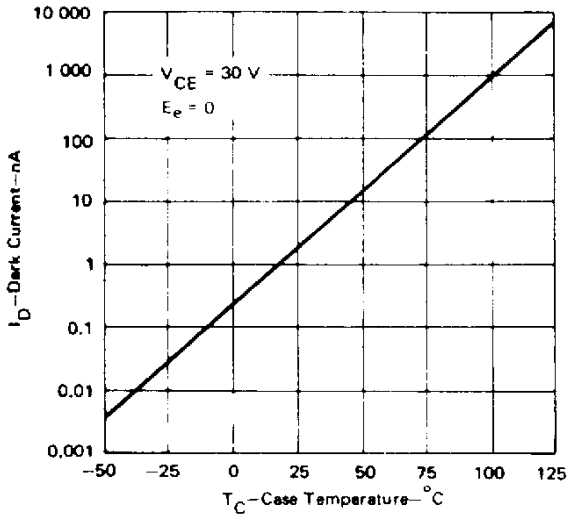


FIGURE 9

RELATIVE OUTPUT
vs
MODULATION FREQUENCY

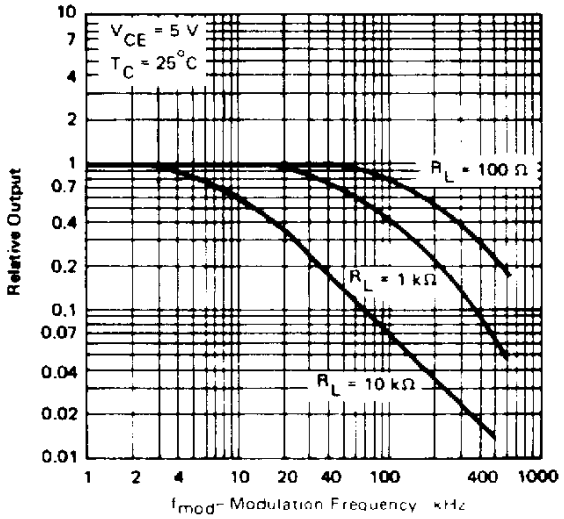


FIGURE 10

COUPLING CHARACTERISTICS
OF TIL23 OR TIL24 WITH TIL602

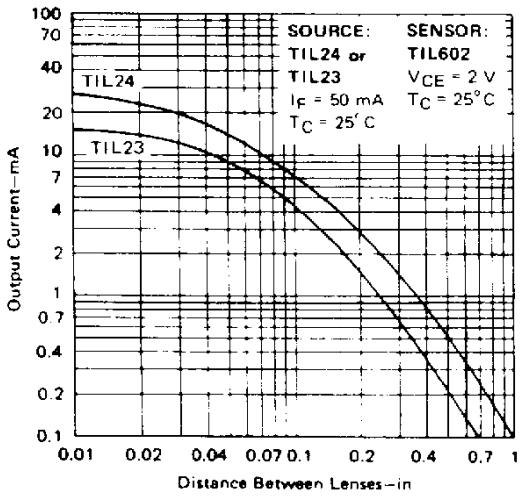


FIGURE 11

RELATIVE OUTPUT
vs
CASE TEMPERATURE OF SOURCE AND SENSOR

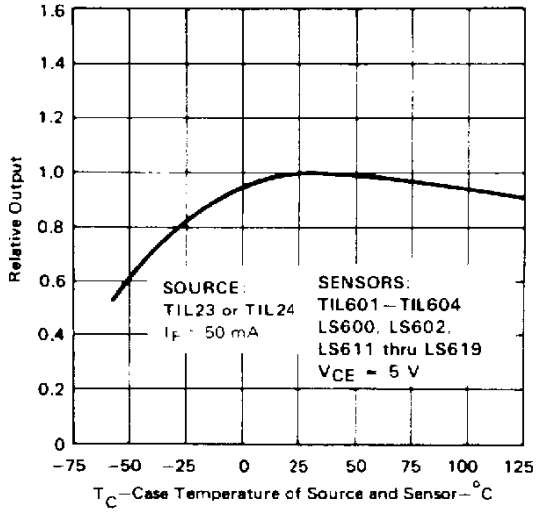


FIGURE 12

TYPICAL CHARACTERISTICS

NORMALIZED LIGHT CURRENT
vs
ANGULAR DISPLACEMENT

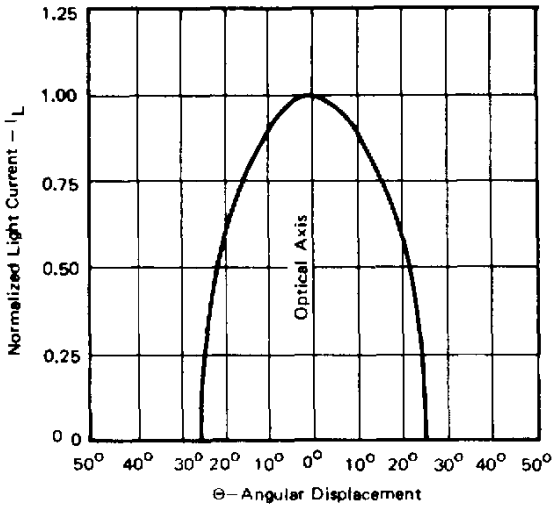


FIGURE 13

RELATIVE SPECTRAL CHARACTERISTICS

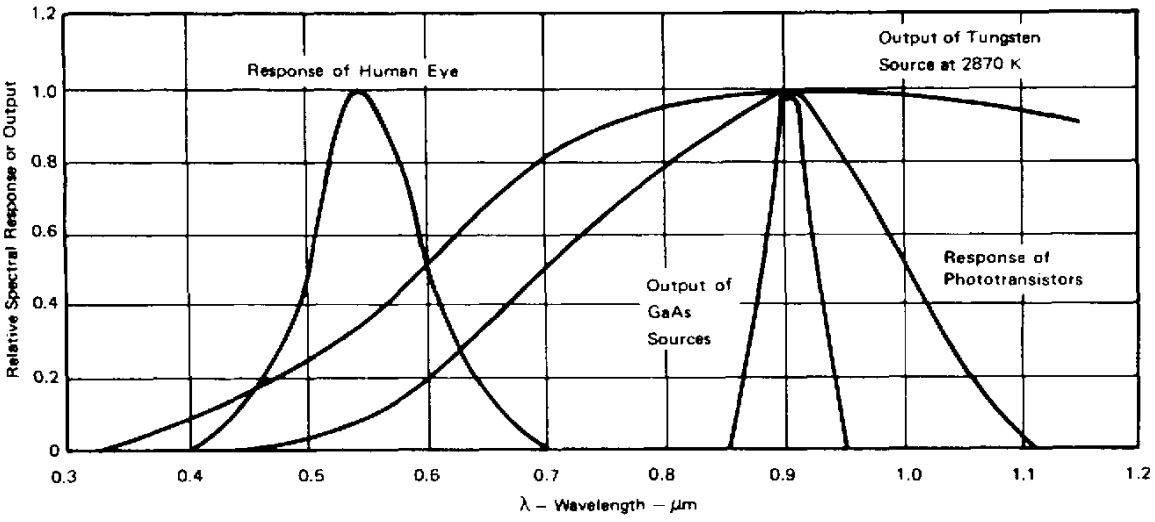


FIGURE 14

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