

T-41-63

**CLR2169
CLR2170
CLR2180**

**Silicon NPN Planar Epitaxial
Darlington Phototransistors**

GENERAL DESCRIPTION — The Clairex CLR2169, CLR2170, and CLR2180 are three-lead, silicon planar epitaxial Darlington phototransistors in a lensed-window, hermetic TO-18 package. The initial stage base lead is provided for those applications where circuitry biasing permits additional gain and switching control. The series is characterized for controlled, high sensitivity at very low irradiance levels. The lensed window unit reduces optical cross-talk from stray light.

ABSOLUTE MAXIMUM RATINGS

Maximum Temperatures

Storage Temperature - 65°C to + 200°C

Operating Junction Temperature + 150°C

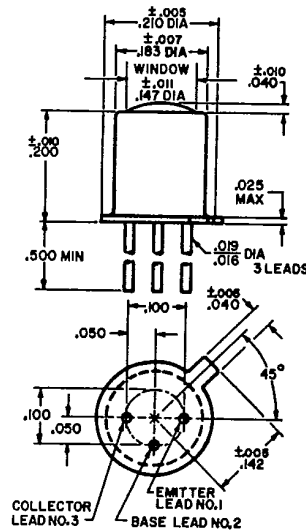
Maximum Power Dissipation

Total Dissipation

at 25°C Ambient Temperature $P_T = 250\text{mW}$

derate 2mW/°C

at 100°C Ambient Temperature $P_T = 100\text{mW}$



Maximum Voltages	CLR2169	CLR2170	CLR2180
V_{CE0} Collector to Base Voltage	60 volts	60 volts	60 volts
V_{CE0} Collector to Emitter Voltage	40 volts	40 volts	40 volts
V_{EB0} Emitter to Base Voltage	10 volts	10 volts	10 volts

Maximum Current: Note 3

I_C Collector Current 200ma

ELECTRICAL CHARACTERISTICS (25°C Free Air unless otherwise designated.)

Symbol	Characteristics	Test Conditions	CLR2169		CLR2170		CLR2180		Unit
			Min.	Max.	Min.	Max.	Min.	Max.	
$I_L (I_{CE0})$	Light Current	$V_{CE} = 5\text{v}$, $H = 0.02\text{mW/cm}^2$, Note 1			0.2	0.8	0.6		ma
$I_L (I_{CE0})$	Light Current	$V_{CE} = 5\text{v}$, $H = 0.2\text{mW/cm}^2$, Note 1	0.5		2.0		4.0		ma
$I_D (I_{CE0})$	Dark Current	$V_{CE} = 10\text{ volts}$, $H = 0$		50		100		100	na
BV_{CE0}	Collector to Emitter Breakdown Voltage	$I_C = 0.1\text{ma}$	40		40		40		volts
BV_{CB0}	Collector to Base Breakdown Voltage	$I_C = 0.1\text{ma}$	60		60		60		volts
BV_{EB0}	Emitter to Base Breakdown Voltage	$I_E = 0.1\text{ma}$	10		10		10		volts
t_r	Light Current Rise Time (unsaturated)	$R_L = 100 \Omega$, $I_C = 0.5\text{ma}$	100 Typical		100 Typical		100 Typical		μsec
t_f	Light Current Fall Time (unsaturated)	$V_{CC} = 5.0\text{ volts}$ Note 2	150 Typical		150 Typical		150 Typical		μsec
$V_{CE (SAT)}$	Collector to Emitter Saturation Voltage	$I_C = 10\text{ma}$, $I_B = 0.05\text{ma}$ $H = 0$		1.2		1.2		1.2	volts

Note 1: The light source is a frosted tungsten incandescent lamp at 2854°K.

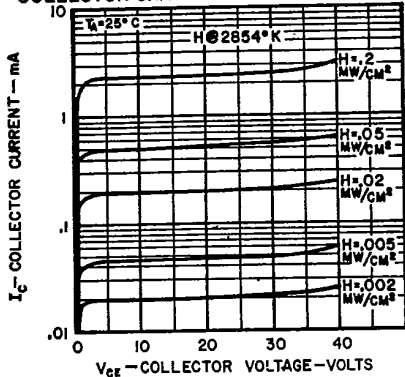
Note 2: The light source is a gallium arsenide LED pulsed with a rise and fall time of < 0.3 μsec .

Note 3: Pulsed conditions : 300 μ sec., 2% duty cycle.

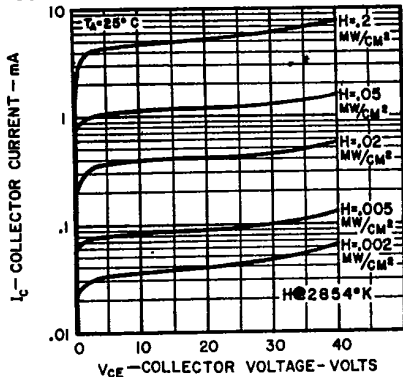
T-41-63

Typical Electrical Characteristics

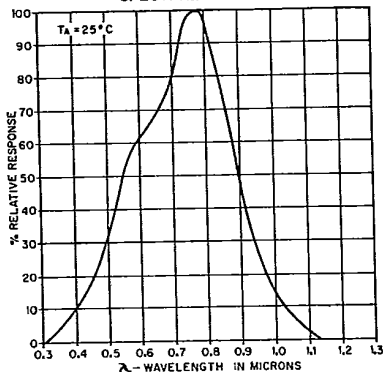
COLLECTOR CHARACTERISTICS CLR 2170



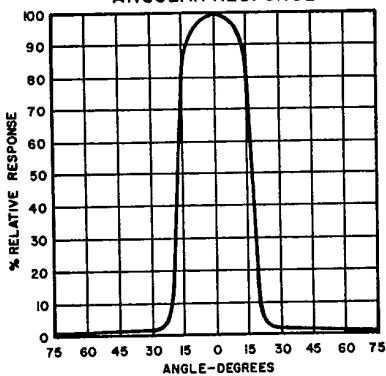
COLLECTOR CHARACTERISTICS CLR 2180



SPECTRAL RESPONSE



ANGULAR RESPONSE



LIGHT CURRENT vs. IRRADIATION

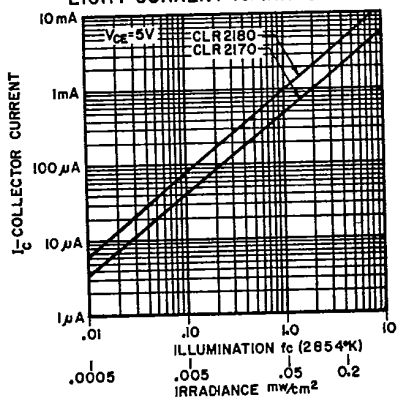


PHOTO-DARLINGTON CIRCUIT

