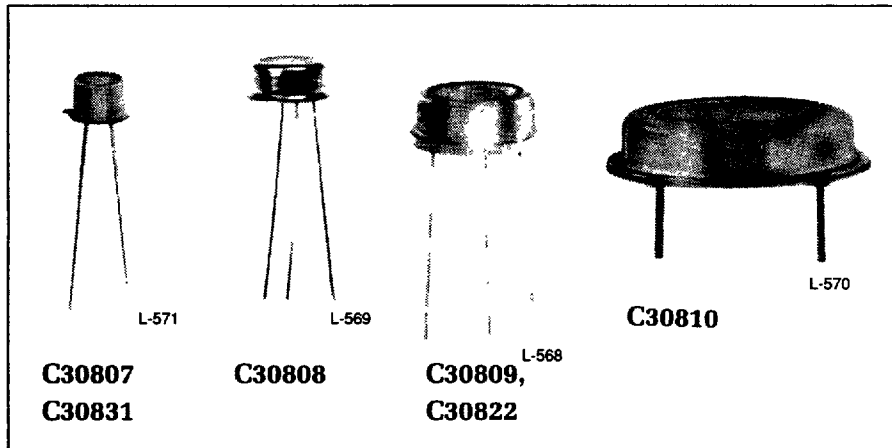


N-Type Silicon p-i-n Photodetectors



- Broad Range of Photo-sensitive Surface Areas
0.2 mm² to 100 mm²
- Low Operating Voltage
V_R = 45 V
- Anti-Reflection Coated to Enhance Responsivity at 900 nm
- Hermetically-Sealed Packages
- Spectra Response Range (10% Points)
400 to 1100 nm

This family of N-type silicon p-i-n photodiodes is designed for use in a wide variety of broad band low light level applications covering the spectral range from below 400 to over 1100 nanometers.

The different types making up this series provide a broad choice in photosensitive areas and in time response characteristics. Each of the types is anti-reflection coated to enhance responsivity at 900 nanometers.

These characteristics make the devices highly useful in HeNe and GaAs laser detection systems and in optical demodulation, data transmission, ranging, and high-speed switching applications.

Maximum Ratings, Absolute-Maximum Values (All Types)

DC Reverse Operating Voltage V _R . . .	100 max.	V
Photocurrent Density, j _p , at 22°C:		
Average value, continuous operation.	5 mA/mm ²	
Peak value.	20 mA/mm ²	
Forward Current, I _F :		
Average value, continuous operation.	10 max. mA	
Peak value.	20 max. mA	
Ambient Temperature:		
Storage, T _{stg}	-60 to + 100	°C
Operating, T _a	-40 to + 80	°C
Soldering:		
For 5 seconds.	200	°C

Mechanical Characteristics

Photosensitive Surface:

Shape -

All types Circular

Area -

Type C30831	0.2 mm ²
Type C30807	0.8 mm ²
Type C30808	5 mm ²
Type C30822	20 mm ²
Type C30809	50 mm ²
Type C30810	100 mm ²

Optical Characteristics

Field of View: ^a

See Figure 5

Approx. Full

Angle For -	Totally Illuminated		Partially Illuminated	
	Photosensitive Surface		Photosensitive Surface	
Type C30831	70		84	deg
Type C30807	62		90	deg
Type C30808	72		120	deg
Type C30822	104		144	deg
Type C30809	74		148	deg
Type C30810	74		140	deg

^a The values specified for field of view are approximate and are critically dependent on the dimensional tolerances of the package components parts.

C30807, C30808, C30809
C30810, C30822, C30831

Electrical Characteristics at $T_A = 22^\circ\text{C}$	At a DC Reverse Operating Voltage (V_R) = 45 Volts ^b , Unless Otherwise Specified									Units
	Type C30807			Type C30808			Type C30809			
	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
Breakdown Voltage, V_{BR}	100	-	-	100	-	-	100	-	-	V
Responsivity:										
At 900 nm.....	0.5	0.6	-	0.5	0.6	-	0.5	0.6	-	A/W
At 1060 nm.....	0.1	0.15	-	0.1	0.15	-	0.1	0.15	-	A/W
Luminous Responsivity (2856 K).....	-	8.5	-	-	8.5	-	-	8.5	-	mA/Im
Quantum Efficiency:										
At 900 nm.....	70	83	-	70	83	-	70	83	-	%
At 1060 nm.....	12	17	-	12	17	-	12	17	-	%
Dark Current, I_d:										
At $V_R = 10\text{ V}$	-	2×10^{-9}	1×10^{-8}	-	5×10^{-9}	2.5×10^{-8}	-	2.5×10^{-8}	1.3×10^{-7}	A
At $V_R = 45\text{ V}$	-	1×10^{-8}	5×10^{-8}	-	3×10^{-8}	1.5×10^{-7}	-	7×10^{-8}	3.5×10^{-7}	A
See Figure 2										
Noise Current, i_n:										
$f = 1000\text{ Hz}$, $\Delta f = 1.0\text{ Hz}$	-	6×10^{-14}	4.2×10^{-13}	-	1×10^{-13}	7×10^{-13}	-	1.5×10^{-13}	1.1×10^{-12}	A/Hz ^{1/2}
See Figure 3										
Noise Equivalent Power (NEP):										
$f = 1000\text{ Hz}$, $\Delta f = 1.0\text{ Hz}$										
At 900 nm.....	-	1×10^{-13}	8×10^{-13}	-	1.5×10^{-13}	1.2×10^{-12}	-	2×10^{-13}	1.6×10^{-12}	W/Hz ^{1/2}
At 1060 nm.....	-	4×10^{-13}	3.2×10^{-12}	-	6.5×10^{-13}	5.2×10^{-12}	-	1×10^{-12}	8×10^{-12}	W/Hz ^{1/2}
Capacitance, C_d.....	-	2.5	3	-	6	10	-	35	45	pF
See Figure 4										
Rise Time, t_r:										
$R_L = 50\ \Omega$, $i\lambda = 900\text{ nm}$, 10% to 90% points....	-	3	5	-	5	8	-	10	15	ns
Fall Time:										
$R_L = 50\ \Omega$, $i\lambda = 900\text{ nm}$, 90% to 10% points....	-	6	10	-	8	13	-	15	20	ns

^b The recommended range of reverse operating voltage V_R at $T_A = 22^\circ\text{C}$ is 0 to 50 volts. However, when the devices are operated in the photovoltaic mode, i.e., at $V_R = 0$ volts, some of the electrical characteristics will differ from those shown.

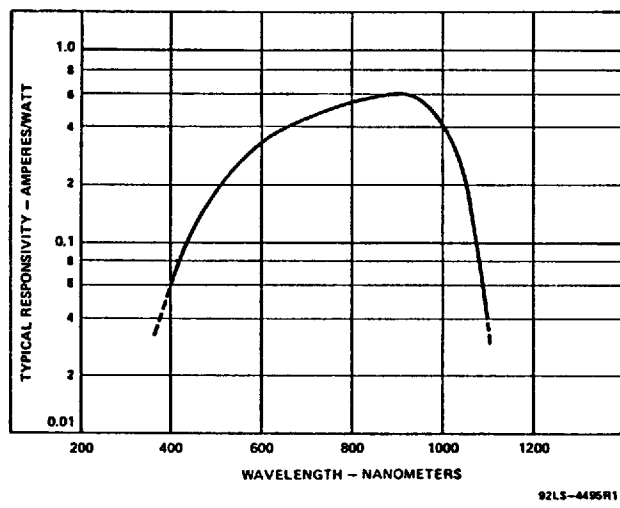


Fig. 1 Typical Spectral Responsivity Characteristic

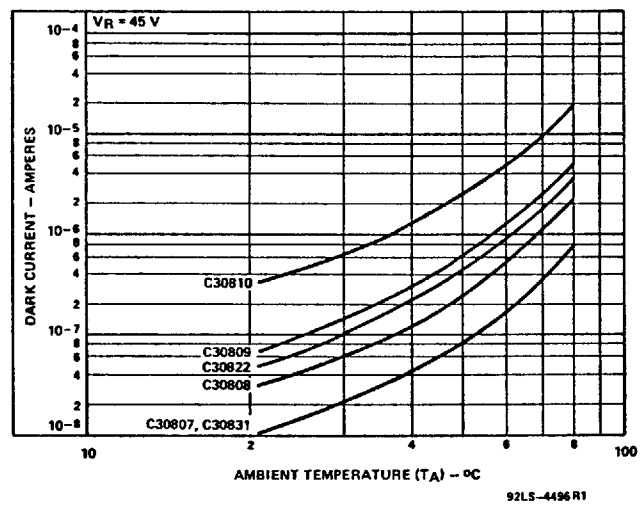


Fig. 2 Typical Dark Current vs Ambient Temperature

T-41-53

Electrical Characteristics at $T_A = 22^\circ\text{C}$	At a DC Reverse Operating Voltage (V_R) = 45 Volts ^b , Unless Otherwise Specified									Units
	Type C30810			Type C30822			Type C30831			
	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
Breakdown Voltage, V_{BR}	100	-	-	100	-	-	100	-	-	V
Responsivity:										
At 900 nm.....	0.5	0.6	-	0.5	0.6	-	0.5	0.6	-	A/W
At 1060 nm.....	0.1	0.15	-	0.1	0.15	-	0.1	0.15	-	A/W
Luminous Responsivity (2856 K).....	-	8.5	-	-	8.5	-	-	8.5	-	mA/lm
Quantum Efficiency:										
At 900 nm.....	70	83	-	-	83	-	-	83	-	%
At 1060 nm.....	12	17	-	-	17	-	-	17	-	%
Dark Current, i_d:										
At $V_R = 10\text{ V}$	-	8×10^{-8}	4×10^{-7}	-	1×10^{-8}	5×10^{-8}	-	1×10^{-9}	5×10^{-9}	A
At $V_R = 45\text{ V}$	-	3×10^{-7}	1.5×10^{-6}	-	5×10^{-8}	2.5×10^{-7}	-	1×10^{-8}	5×10^{-8}	A
See Figure 2										
Noise Current, I_n:										
$f = 1000\text{ Hz}$, $\Delta f = 1.0\text{ Hz}$	-	3×10^{-13}	2.1×10^{-12}	-	1.3×10^{-13}	9×10^{-13}	-	6×10^{-14}	4.2×10^{-13}	A/Hz ^{1/2}
See Figure 3										
Noise Equivalent Power (NEP):										
$f = 1000\text{ Hz}$, $\Delta f = 1.0\text{ Hz}$										
At 900 nm.....	-	4.5×10^{-13}	3.6×10^{-12}	-	2×10^{-13}	1.5×10^{-12}	-	1×10^{-13}	8×10^{-13}	W/Hz ^{1/2}
At 1060 nm.....	-	2×10^{-12}	1.6×10^{-11}	-	8×10^{-13}	7×10^{-12}	-	4×10^{-13}	3.2×10^{-12}	W/Hz ^{1/2}
Capacitance, C_d.....	-	70	90	-	17	20	-	2	2.5	pF
See Figure 4										
Rise Time, t_r:										
$R_L = 50\ \Omega$, $\lambda = 900\text{ nm}$, 10% to 90% points....	-	12	17	-	7	12	-	3	5	ns
Fall Time:										
$R_L = 50\ \Omega$, $\lambda = 900\text{ nm}$, 90% to 10% points....	-	20	30	-	10	15	-	6	10	ns

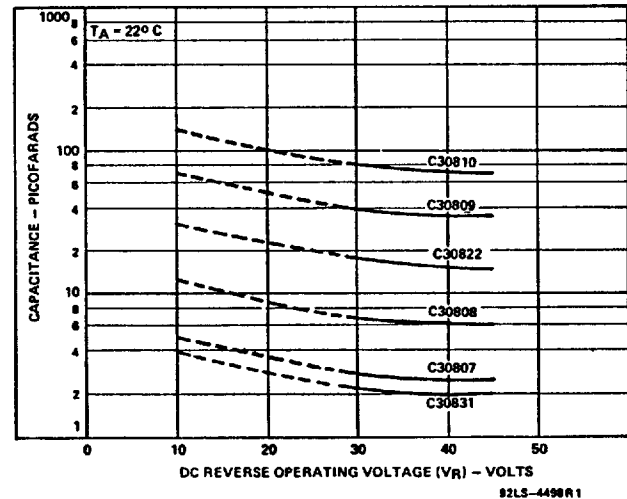
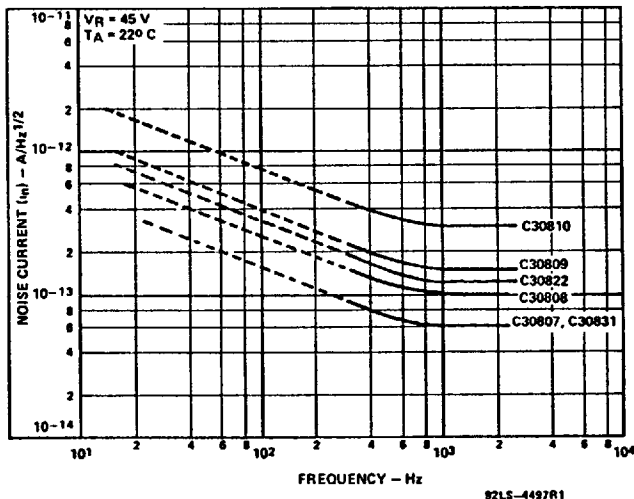
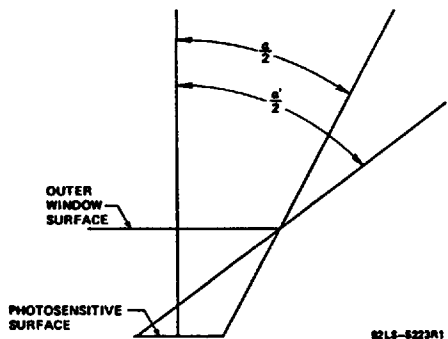


Fig. 3 Typical Noise Current vs Frequency

Fig. 4 Typical Photodiode Capacitance vs Operating Voltage

C30807, C30808, C30809
C30810, C30822, C30831

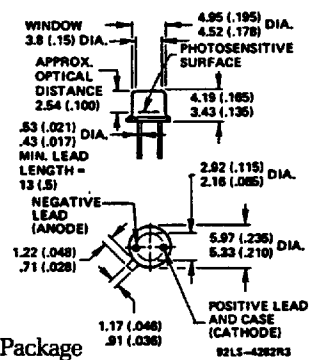
T-41-53



Full incident radiation at angles $\leq \frac{a}{2}$ the photosensitive surface is totally illuminated.

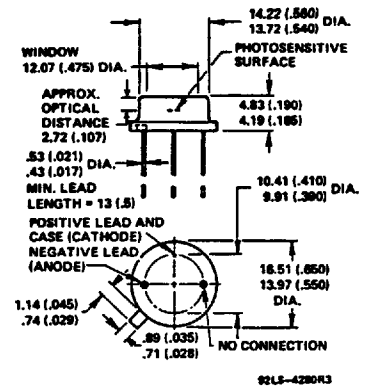
Full incident radiation at angles $\leq \frac{a}{2}$, but $\leq \frac{a'}{2}$ the photo-sensitive surface is totally illuminated.

Fig. 5 Definition of Half-Angle Approx. Field-of-View. (Scale is exaggerated for clarity)



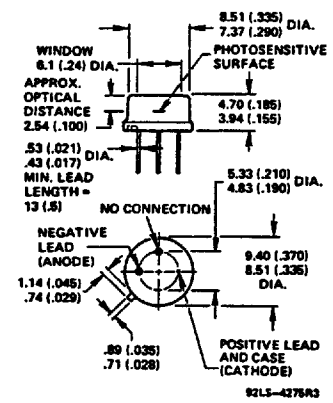
Modified TO-18 Package

Fig. 6 Dimensional Outline for C30807 and C30831



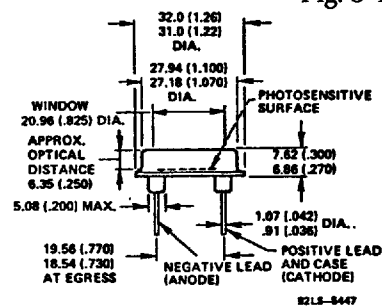
Low-Profile TO-8 Package

Fig. 7 Dimensional Outline for C30809 and C30822



Low-Profile TO-5 Package

Fig. 8 Dimensional Outline for C30808



RCA 25-mm Package

Fig. 9 Dimensional Outline for C30810

Dimensions in millimeters. Dimensions in parentheses are in inches.

For further information, please contact your local RCA Electro Optics representative or RCA Inc., Electro Optics, P.O. Box 900, Vaudreuil, Canada J7V 7X3
Tel.: (514) 455-6191

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