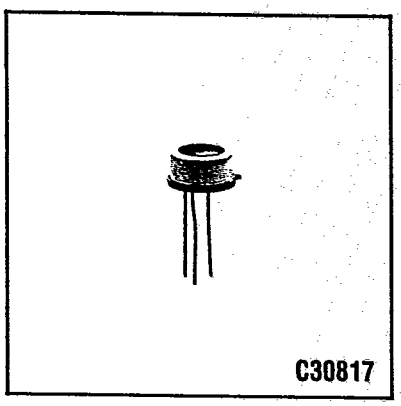
RCA Electro Optics

Photodiode C30817

DATA SHEET



Silicon Avalanche Photodiode for General-Purpose Applications

- High Quantum Efficiency — 85% typical at 900 nm — 18% typical at 1060 nm
- Spectral Response Range — (10% pts) 400 to 1100 nm
- Fast Time Response — Rise time typically 2 ns — Fall time typically 2 ns
- Wide Operating Temperature Range — -40°C to +70°C
- Hermetically-Sealed Low-Profile TO-5 Package

RCA Type C30817 is a general-purpose silicon avalanche photodiode made using a double-diffused "reach through" structure. This structure provides high responsivity between 400 to 1100 nanometers as well as fast rise and fall times at all wavelengths. Because the fall time characteristic has no "tail", the responsivity of the device is independent of modulation frequency up to about 200 MHz.

The C30817 is hermetically sealed behind a flat glass window in a modified low-profile TO-5 package.

This device is useful in a wide variety of applications including laser detection, ranging, optical communications, high-speed switching, and transit-time measurements.

Maximum Ratings, Absolute Maximum Values

Reverse Bias Dark Current	100 max.	μA
Photocurrent Density, J_p, at 22° C:		
Average value, continuous operation	5	mA/mm²
Peak value	20	mA/mm²
Forward Current, I_F, at 22°C:		
Average value, continuous operation	5 max.	mA
Peak value (For 1 second duration, non-repetitive)	50 max.	mA
Maximum Total Power Dissipation at 22°C:	0.1 max.	W
Ambient Temperature		
Storage, T_{stg}	-60 to +100	°C
Operating, T_A	-40 to +70	°C
Soldering:		
For 5 seconds	200	°C

Mechanical Characteristics

Photosensitive Surface:

Shape	Circular
Useful area	0.5 mm²
Useful diameter	0.8 mm

Optical Characteristics

Field of View[a]:

See Figure 9 —

Full angle (α) for totally illuminated photosensitive surface	110 deg
Full angle (α') for partially illuminated photosensitive surface	125 deg

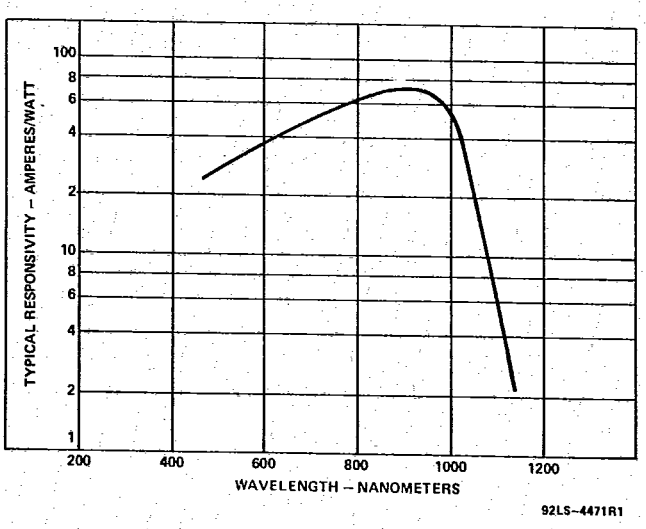


Figure 1 — Typical Spectral Responsivity Characteristic at a Gain of 120

Electrical Characteristics at T_A=22°C	At the DC reverse operating voltage V_R supplied with the device and a light spot diameter of 0.25 mm (0.01"), unless otherwise specified. See footnote [b].			Units
	Min.	Typ.	Max.	
Breakage Voltage, V_{BR}	300	375	475	V
For V_{BR} at other Temperatures, see Figures 2 and 3.				
Temperature Coefficient of V_R for Constant Gain	—	2.2	—	V/°C
Gain	—	120	—	
Responsivity:				
At 900 nm	65	75	—	A/W
At 1060 nm	15	18	—	A/W
Quantum Efficie.				
At 900 nm	—	85	—	%
At 1060 nm	—	18	—	%
Total Dark Current, I_d	—	5×10^{-8}	2×10^{-7}	A
Noise Current, i_n f = 10 kHz, Δf = 1.0 Hz See Figure 5	—	1×10^{-12}	2×10^{-12}	$A/Hz^{1/2}$
Capacitance, C_d	—	2	4	pF
Series Resistance	—	—	15	Ω
Rise Time, t_r: R_L = 50Ω, λ = 900 nm, 10% to 90% pts.	—	2	3	ns
Fall Time: R_L = 50Ω, λ = 900 nm, 90% to 10% pts.	—	2	3	ns

[a] The values specified for field of view are appriximate and are critically dependent on the dimensional tolerances of the package component parts.

[b] A specific value of V_R is supplied with each device. When the photodiode is operated at this voltage, the device will meet the electrical characteristic limits shown above. The voltage value will be within the range of 275 to 425 volts.

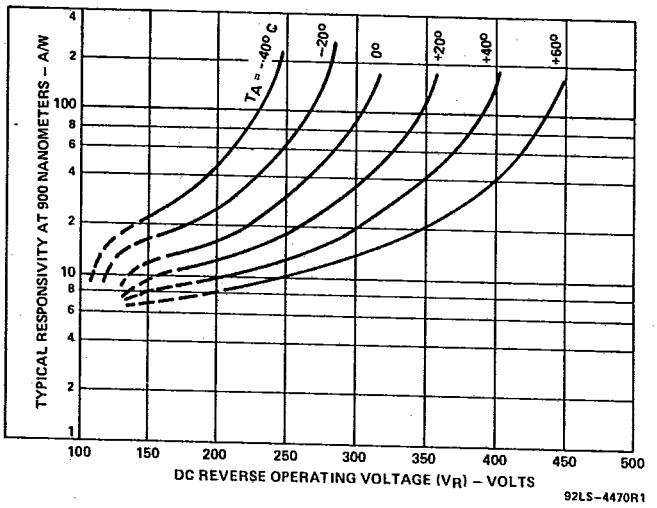


Figure 2 — Typical Responsivity at 900 nm vs Operating Voltage

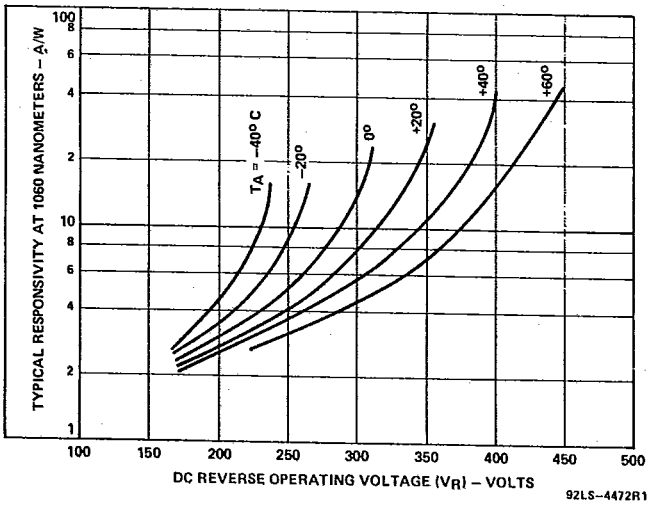


Figure 3 — Typical Responsivity at 1060 nm vs Operating Voltage

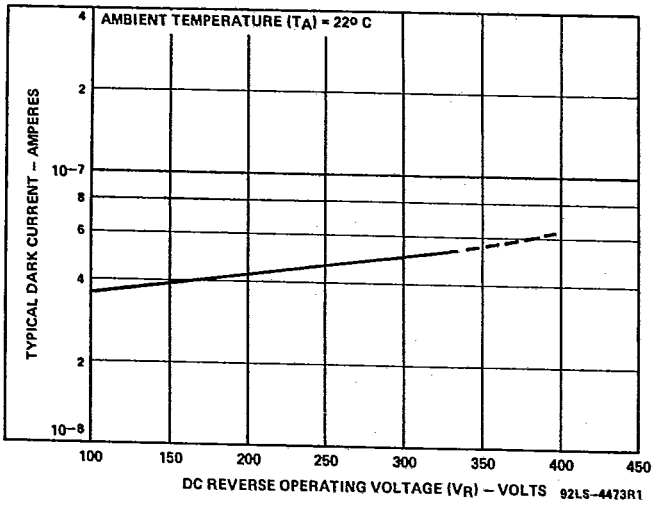


Figure 4 — Typical Dark Current vs Operating Voltage

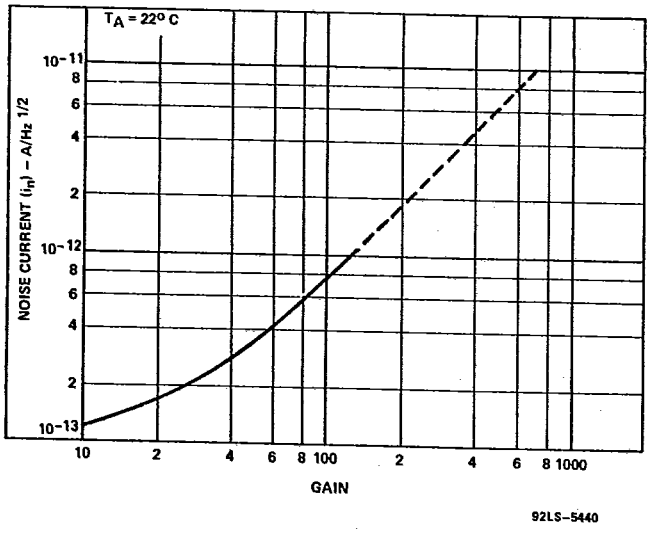


Figure 5 — Typical Noise Current vs Gain

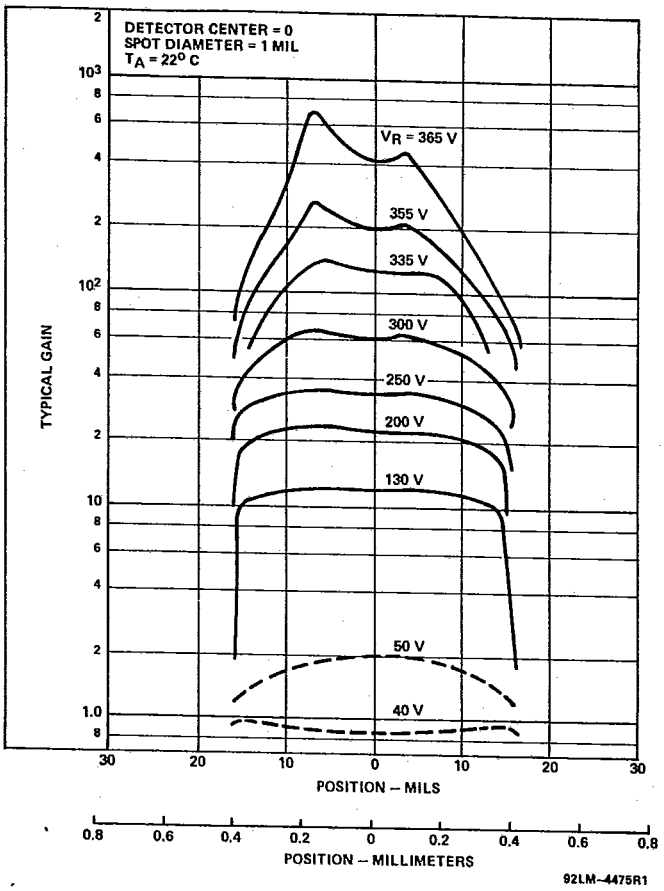


Figure 6 — Typical Gain vs Light Spot Position

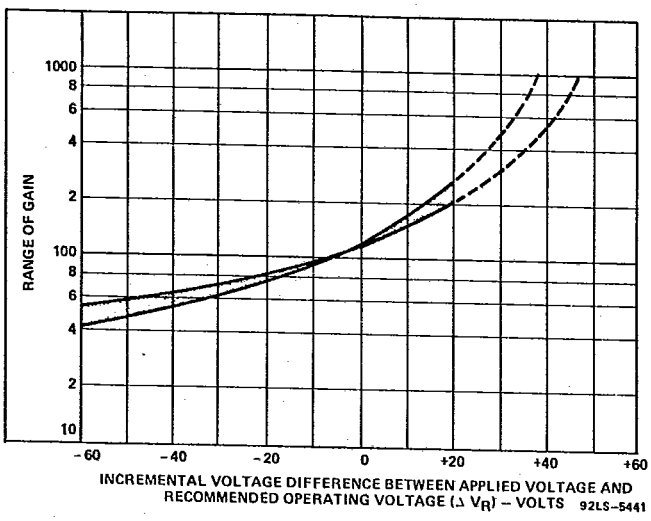
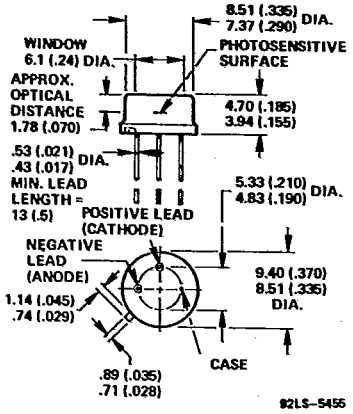


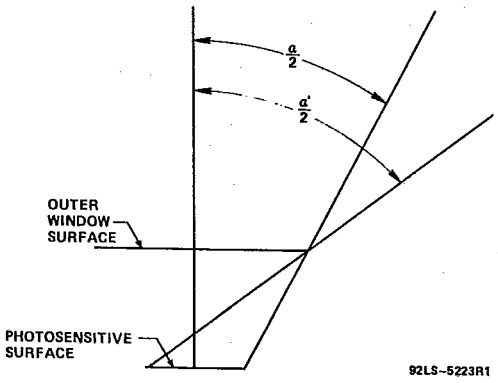
Figure 7 — Variation of Gain as a Function of Difference Between Actual Applied Operating Voltage and Recommended Operating Voltage



Low-Profile Package TO-5

Note: Optical distance is defined as the distance from the surface of the silicon chip to the front surface of the window.

Figure 8 — Dimensional Outline



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

For incident radiation at angles $> \frac{a}{2}$ but $\leq \frac{a'}{2}$, the photosensitive surface is partially illuminated.

Figure 9 — Definition of Half-Angle Approx. Field-of-View. (Scale is exaggerated for clarity)

Warning — Personal Safety Hazards

Electric Shock — Operating voltages applied to this device present a shock hazard.

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
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