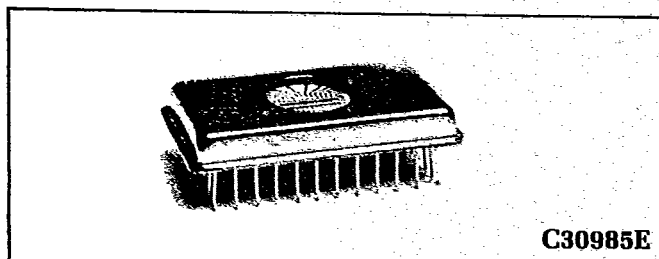


RCA Electro Optics

Photodiode C30985E

DATA SHEET

25-Element Silicon Avalanche Photodiode Linear Array for Detection of 900 to 1060 nm Radiation



C30985E

L-1117

RCA Developmental Type C30985E is a multi-element silicon avalanche photodiode made using a double-diffused "reach through" structure. This structure provides high responsivity up to 1060 nanometers and beyond as well as fast rise and fall times at all wavelengths. Because the fall time characteristic has no "tail", the responsivity of the C30985E is independent of modulation frequency up to about 200 MHz.

The C30985E is hermetically-sealed behind a flat glass window in a low-profile rectangular 34-pin package.

Absolute-Maximum Ratings

Limiting Values

Reverse Bias Current, Total	200 max. μ A
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 , 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

These are limiting values of operating and environmental conditions. Exceeding these values can cause damage to the device.

Optical Characteristics

Field of View:

Full angle for totally illuminated photosensitive surface>90 deg

- High Quantum Efficiency —
85% typical at 900 nm
18% typical at 1060 nm
- Spectral Response Range (10% Points) —
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 Rectangular Package

Mechanical Characteristics

Photosensitive Surface:

Total active length	 7.5 mm
Useful active width	 0.3 mm
Center-to-center spacing	 0.3 mm
Dead space between elements (typical)	.. 75 μ m

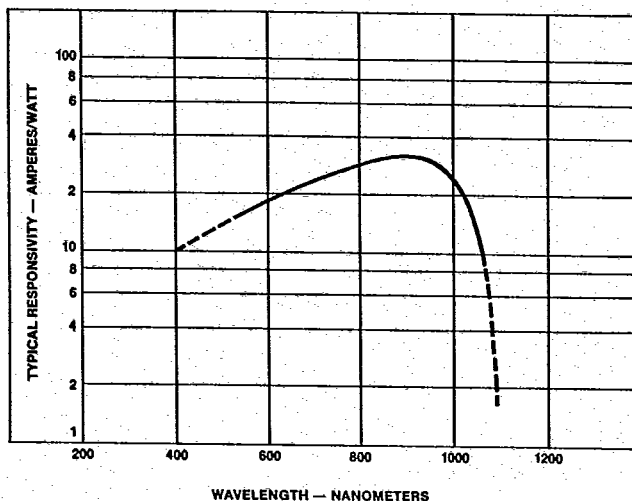


Fig. 1 Typical Spectral Responsivity Characteristics at a Gain of 50

LS-8343

T-41-55

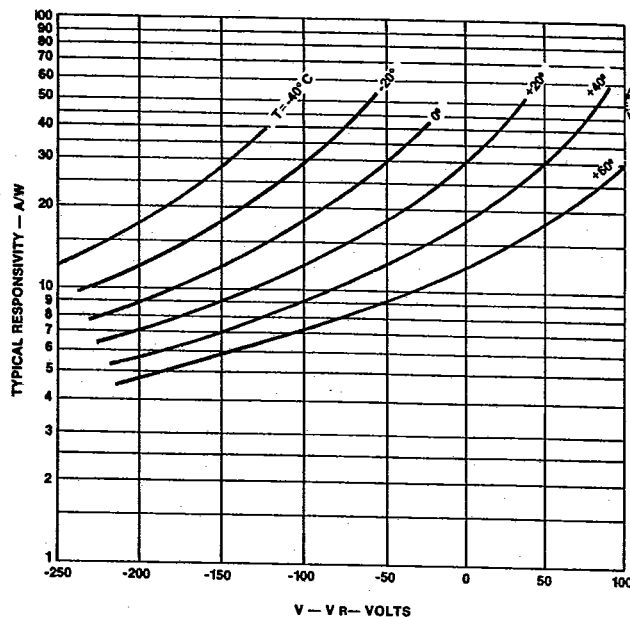
Electrical Characteristics at $T_A = 22^\circ\text{C}$

At the DC reverse operating voltage V_R supplied with the device and a light spot diameter of 0.025 mm (0.001") centered on a typical element, unless otherwise specified. See footnote 1.

	Min.	Typ.	Max.	Units
Breakdown Voltage, V_{BR}	350	450	525	V
Operation Point from Breakdown ($V_{BR} - V_R$)	—	100	—	V
Temperature Coefficient of V_R for Constant Gain	—	2.4	—	$V/^\circ\text{C}$
Gain	—	50	—	—
Element-to-Element Gain Non-Uniformity	—	± 15	± 20	%
Responsivity: ²				
At 900 nm	25	31	—	A/W
At 1060 nm	6	7.5	—	A/W
Quantum Efficiency:				
At 900 nm	—	85	—	%
At 1060 nm	—	18	—	%
Width of Low-Gain Region Between Elements (see Figure 6)	—	75	—	μm
Dark Current:				
Guard ring	—	100	300	nA
Each element	—	1	—	nA
Noise Current, i_n :				
$f = 10\text{ kHz}, \Delta f = 1.0\text{ Hz}$				
All elements	—	0.5	1.0	$\text{pA}/\text{Hz}^{1/2}$
Each element	—	0.1	0.3	$\text{pA}/\text{Hz}^{1/2}$
Capacitance:				
Total	—	15	—	pF
Each element	—	0.5	—	pF
Interelectrode	—	0.2	—	pF
Series Resistance:				
Each element	—	—	100	Ω
Rise Time, t_r :				
$R_L = 50\ \Omega, \lambda = 900\text{ nm}, 10\% \text{ to } 90\% \text{ points}$	—	2	3.5	ns
Fall Time:				
$R_L = 50\ \Omega, \lambda = 900\text{ nm}, 90\% \text{ to } 10\% \text{ points}$	—	2	3.5	ns

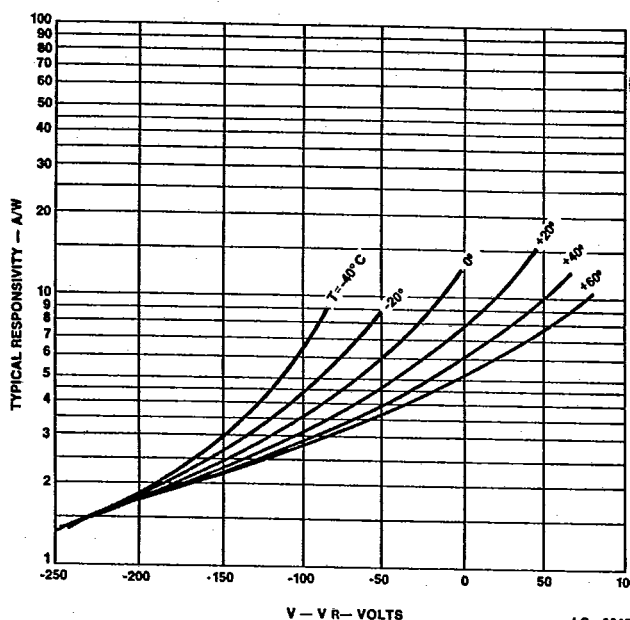
¹ A specific value of V_R is supplied with each device. When the photodiode is operated at this voltage, the device will meet the electrical characteristic limits shown above. The voltage value will be within the range of 275 to 425 volts.

² Standard A/R coating is optimized for wavelength range 800 – 1060 nm.



LS-8344

Fig. 2 Typical Variation of Responsivity at 900 nm as a Function of Temperature and Voltage Difference From the Designated Voltage, V_R (See Footnote 1)



LS-8345

Fig. 3 Typical Variation of Responsivity at 1060 nm as a Function of Temperature and Voltage Difference From the Designated Voltage, V_R (See Footnote 1)

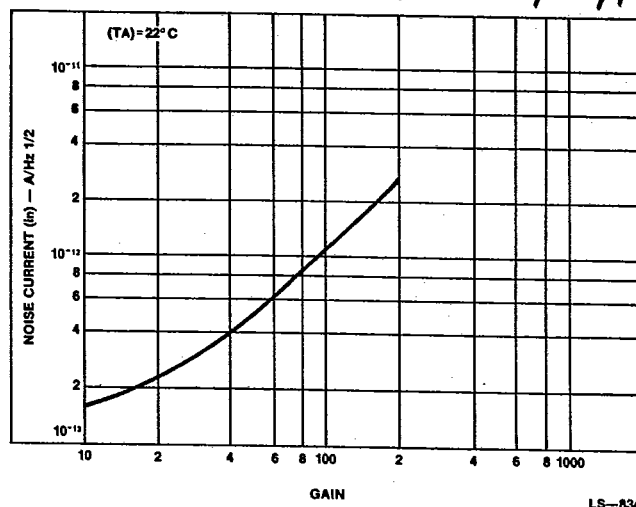
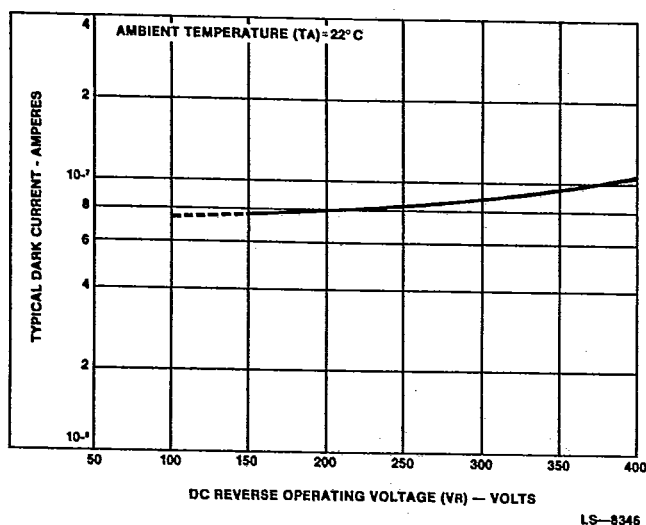


Fig. 4 Typical Guard Ring Dark Current vs Operating Voltage

Fig. 5 Typical Noise Current vs Gain (All Elements Connected Together)

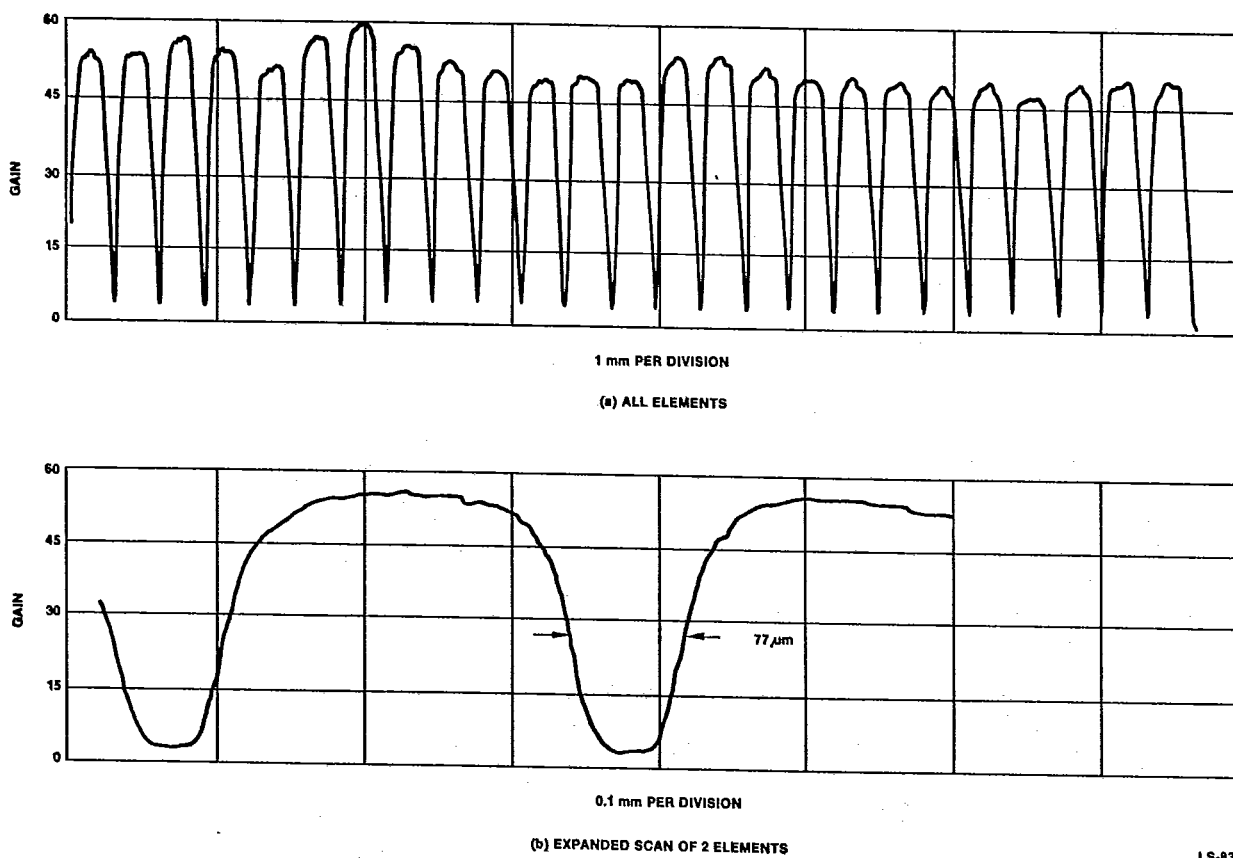
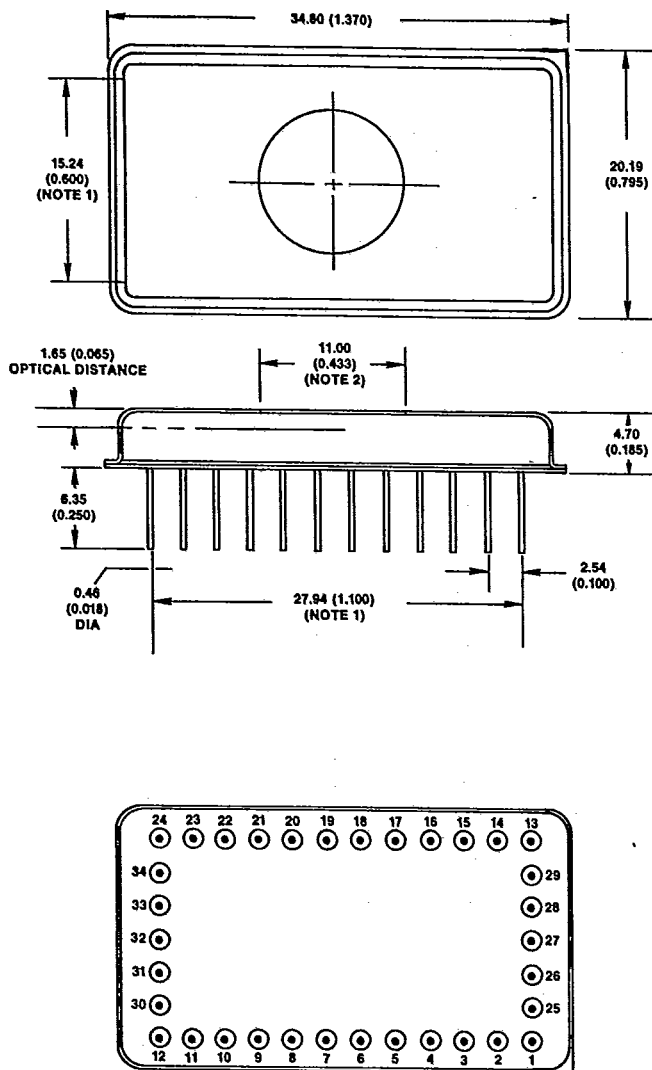


Fig. 6 Gain Scan of Typical Array (Spot Size = 0.025 mm)



34-pin Rectangular Package
(Bottom-View)

LM-8349RI

Pin Connections

- 1: Element 1
- 2: Element 3
- 3: Element 5
- 4: Element 7
- 5: Element 9
- 6: Element 11
- 7: Element 13
- 8: Element 15
- 9: Element 17
- 10: Element 19
- 11: Element 21
- 12: Element 23
- 13: Element 2
- 14: Element 4
- 15: Element 6
- 16: Element 8
- 17: Element 10
- 18: Element 12
- 19: Element 14
- 20: Element 16
- 21: Element 18
- 22: Element 20
- 23: Element 22
- 24: Element 24
- 25: N/C
- 26: N/C
- 27: Bias (Negative)
- 28: N/C
- 29: Guard Ring
- 30: Element 25
- 31: N/C
- 32: Case Ground
- 33: N/C
- 34: Guard Ring

Note 1 - Pin spacing.

Note 2 - Window diameter.

Note 3 - Optical distance of detector surface from top of window is 1.65 mm (0.065 in).

Fig. 7 Dimensional Outline and Pin Connections

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

Consistent with RCA Inc's policy of continually updating and improving its products, the type designation and data are subject to change, unless otherwise arranged. No obligations are assumed for notice of change of future manufacture of these devices or materials.

Trademark(s)® Registered Marca(s) Registrada(s). Information furnished by RCA is believed to be accurate and reliable. However, no responsibility is assumed by RCA for its use; nor for any infringements of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of RCA Inc. or its affiliates.