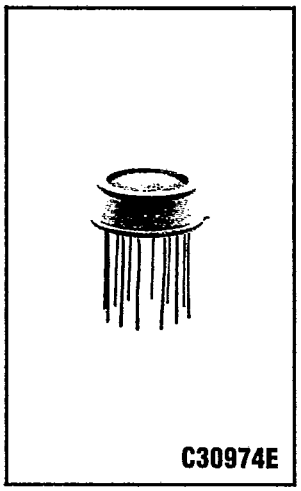
RCA Electro Optics

Si Photodiode C30974E

DATA SHEET



Rectangular Silicon Avalanche Photodiode Preamplifier Module

- Responsivity at T_A = 25°C - 3.7×10^5 V/W at 900 nm — 1.8×10^5 V/W at 1060 nm
- System Noise Equivalent Power (NEP) at T_A = 25°C - 6.7×10^{-14} W/Hz$^{1/2}$ at 900 nm — 14.0×10^{-14} W/Hz$^{1/2}$ at 1060 nm
- System Bandwidth (3 dB Point) — DC to 20 MHz
- Spectral Response Range (10% Points) — 400 to 1100 nm
- Low Power Consumption
- Wide Range of Amplifier Operating Voltages
- Hermetically-Sealed Modified TO-8 Package

RCA Type C30974E is a Silicon Avalanche Photodiode with a hybrid preamplifier supplied in a single modified 12-lead TO-8 package.

The avalanche photodiode used in this device is made using a "reach through" structure which provides very good response between 400 and 1100 nanometers and very fast rise and fall times at all wavelengths. The preamplifier section is designed to neutralize the input capacitance of a unity voltage gain amplifier. An emitter follower is used as an output buffer stage.

To obtain the wideband characteristics, the output of these devices should be AC (capacitively) coupled to a 50-ohm termination. The module must not be DC coupled to loads of less than 10,000 ohms.

Absolute Maximum Ratings, Limiting Values

Photodiode Bias Voltage:		
At T_A = +70°C	600	V
At T_A = −40°C	300	V
Photodiode Total Current (All temp.):		
Average	100	μA
Peak	100	mA
Preamplifier Voltage:		
Maximum	±12.5	V
Minimum	±5.5	V
Incident Radiant Flux, Φ_M:		
Average value	5.0	μW
Peak value	5.0	mW
Ambient Temperature:		
Storage, T_{stg}	−50 to +100	°C
Operating, T_A	−40 to +70	°C

Mechanical Characteristics

Diode Chip Dimensions	0.8 × 7 mm
Full Angle for Totally Illuminated Surfaces	>90 degrees

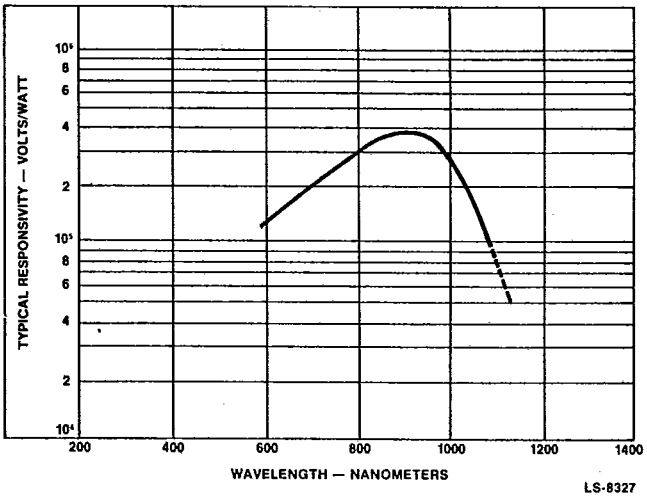


Figure 1 — Typical Spectral Responsivity Characteristics

C30974E T-41-67

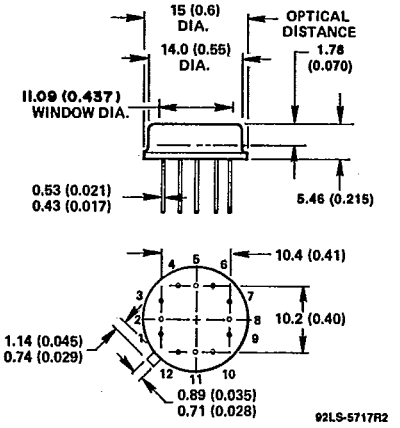
Electrical Characteristics[1]

At an ambient temperature (T_A) of 22°C and the DC reverse operating voltage (V_R) value supplied with each device.[2]

	Min.	Typ.	Max.	Units
Temperature Coeffic. of V_R for Constant Gain at 900 nm . . .	—	2.4	—	V/°C
Responsivity:				
At 900 nm	—	3.7×10^5	—	V/W
At 1060 nm	—	1.8×10^5	—	V/W
Noise Equivalent Power (NEP):				
f = 100 kHz, Δf = 1.0 Hz				
At 900 nm	—	0.067	0.11	$pW/Hz^{1/2}$
At 1060 nm	—	0.14	0.22	$pW/Hz^{1/2}$
Output Spectral Noise Voltage Density:				
f = 100 kHz — 100 MHz, Δf = 1.0 Hz	—	25	40	$nV/Hz^{1/2}\mu$
Output Impedance	—	25	50	Ω
System Bandwidth, f_o (3 dB point) . . .	15	20	—	MHz
Rise Time, t_r:				
λ = 900 and 1060 nm				
10% to 90% pts	—	22	30	ns
Fall Time:				
λ = 900 and 1060 nm				
90% to 10% pts	—	22	30	ns
Linear Output Voltage Swing . . .	0.5	0.7	—	V
Voltage Swing . . .	—	—	2.0	V
Output Offset Voltage	0.0	−0.8	−1.0	V
Supply Current . . .	—	4.0	8.0	mA

[1] All measurements are made with the device AC (capacitively) coupled into a 50 Ω termination.

[2] A specific value of V_R is supplied with each device. The voltage value will be within the range 275 - 425 V.



Pin Connections

1: Signal Output
2: No Connection, Do Not Use
3: $-V_{CC}$ Negative Bias for Amplifier
4: Positive Bias for Photodiode
5: No Connection, Do Not Use
6: Case
7: Signal Ground
8: Temp. Sensing Diode — Anode
9: Temp. Sensing Diode — Cathode
10: Ground (Power Supply)
11: No Connection, Do Not Use
12: $+V_{CC}$ Positive Bias for Amplifier

Figure 2 - Dimensional Outline

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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