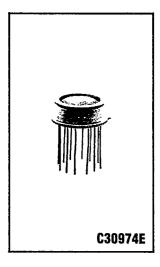
## Electro

# Si Photodiode C30974E

### DATA SHEET



## Rectangular Silicon Avalanche Photodiode Preamplifier Module

- Responsivity at  $T_A = 25^{\circ}C 3.7 \times 10^5 \text{ V/W}$  at 900 nm  $1.8 \times 10^5 \text{ V/W}$  at 1060 nm
- System Noise Equivalent Power (NEP) at  $T_A = 25$  °C  $6.7 \times 10^{-14}$  W/Hz<sup>1/2</sup> at 900 nm  $14.0 \times 10^{-14}$  W/Hz<sup>1/2</sup> 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 $T_A = +70^{\circ}C$	V
At $T_A = -40$ °C300	V
Photodiode Total Current (All temp.):	
Average100	$\mu$ A
Peak100	mΑ
Preamplifier Voltage:	
Maximum± 12.5	V
$Minimum \pm 5.5$	V
Incident Radiant Flux, $oldsymbol{\Phi}_{ extsf{M}}$ :	
Average value	$\mu_{W}$
Peak value	mW
Ambient Temperature:	
Storage, $T_{stg}$	۰C
Operating, $T_A \dots -40 \text{ to } +70$	°C
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#### **Mechanical Characteristics**

Diode Chip Dimensions 0.8 $\times$ 7 mm
Full Angle for Totally Illuminated
Surfaces>90 degrees

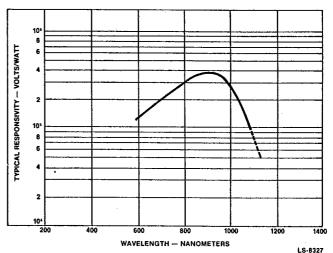


Figure 1 — Typical Spectral Responsivity Characteristics

#### 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.<sup>2</sup>

Temperature Coeffic. of $V_R$ for Constant Gain at 900 nm
$\begin{array}{cccccccccccccccccccccccccccccccccccc$
At 1060 nm — 1.8 $\times$ 10 <sup>5</sup> — V/W Noise Equivalent Power (NEP): $f = 100 \text{ kHz}$ , $\Delta f = 1.0 \text{ Hz}$ At 900 nm — 0.067 0.11 pW/Hz <sup>1/2</sup> At 1060 nm — 0.14 0.22 pW/Hz <sup>1/2</sup> Output Spectral Noise Voltage Density: $f = 100 \text{ kHz}$ — 100 MHz,
Power (NEP): $f = 100 \text{ kHz}, \\ \Delta f = 1.0 \text{ Hz} \\ \text{At } 900 \text{ nm} \dots - 0.067  0.11  pW/\text{Hz}^{1/2} \\ \text{At } 1060 \text{ nm} \dots - 0.14  0.22  pW/\text{Hz}^{1/2} \\ \text{Output Spectral} \\ \text{Noise Voltage} \\ \text{Density:} \\ f = 100 \text{ kHz} - \\ 100 \text{ MHz}, \\ \\$
At 1060 nm — 0.14 0.22 pW/Hz $^{1/2}$ Output Spectral Noise Voltage Density: $f = 100 \text{ kHz}$ — 100 MHz,
Output Spectral Noise Voltage Density: f = 100 kHz 100 MHz,
Δ1 - 1.0 112 — 20 40 11V/Π2""μ
Output Impedance — 25 50 $\Omega$
System Bandwidth, $f_o$ (3 dB point) 15 20 — MHz
Rise Time, $t_r$ : $\lambda = 900$ and 1060 nm 10% to 90% pts — 22 30 ns
Fall Time: $\lambda = 900 \text{ and}$ 1060 nm 90% to 10% pts — 22 30 ns
Linear Output
· · · · · · · · · · · · · · · · · · ·
Voltage Swing — 2.0 V Output Offset
Voltage 0.0 -0.8 -1.0 V
Supply Current — 4.0 8.0 mA

<sup>11.09 (0.437)</sup>WINDOW DIA.

0.53 (0.021)
0.43 (0.017)

1.14 (0.045)
0.74 (0.029)

1.15 (0.6)
DIA.

0 OPTICAL DISTANCE
(0.070)
1.170
(0.070)

5.46 (0.215)

1.14 (0.045)
0.74 (0.029)
0.79 (0.035)
0.71 (0.028)

92LS-5717R2

#### 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<sub>cc</sub> 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
Tel.: (514) 455-6191

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 $<sup>^{1}</sup>$  All measurements are made with the device AC (capacitively) coupled into a 50  $\Omega$  termination.

 $<sup>^2\,</sup>$  A specific value of  $V_R$  is supplied with each device. The voltage value will be within the range 275 - 425 V.