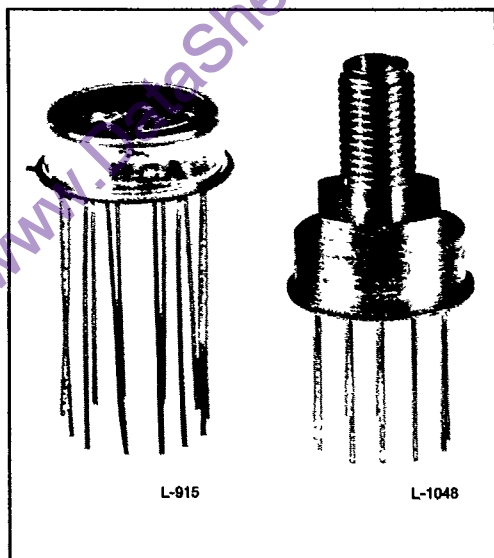


RCA Electro Optics
and Devices

Solid State Detectors

Developmental Types

C30950 Series


Photodiodes

Very Wide Bandpass Silicon Avalanche Photodiode - Preamplifier Modules

Available With Integral Light Pipes For Fiber Optic Applications

- **Responsivity at $T_A = 25^\circ \text{C}$ -**
 $5.6 \times 10^5 \text{ V/W at } 900 \text{ nm (50 MHz)}$
 $1.9 \times 10^5 \text{ V/W at } 830 \text{ nm (100 MHz)}$
 $4.9 \times 10^4 \text{ V/W at } 830 \text{ nm (200 MHz)}$
- **Spectral Response Range (10% Points) -**
 $400 \text{ to } 1000 \text{ nm, } 400 \text{ to } 1100 \text{ nm}$
- **System Bandwidth (3 dB Point) -**
 $\text{DC to } 50 \text{ MHz, } 100 \text{ MHz, } 200 \text{ MHz}$
- **System Noise Equivalent Power (NEP) at $T_A = 25^\circ \text{C}$ -**
 $2.7 \times 10^{-14} \text{ W/Hz}^{1/2} \text{ at } 900 \text{ nm (50 MHz)}$
 $7.9 \times 10^{-14} \text{ W/Hz}^{1/2} \text{ at } 830 \text{ nm (100 MHz)}$
 $2.6 \times 10^{-13} \text{ W/Hz}^{1/2} \text{ at } 830 \text{ nm (200 MHz)}$
- **Low Power Consumption**
- **Wide Range of Amplifier Operating Voltages**
- **Hermetically-Sealed Modified TO-8 Packages**

RCA Developmental Types C30950E, C30950F, and C30950G are Silicon Avalanche Photodiodes with a hybrid preamplifier supplied in a single modified 12-lead TO-8 package. RCA Developmental Types C30950EL, C30950FL, C30950GL are Silicon Avalanche Photodiode-Preamplifier Modules with integral light pipes supplied in a single modified 12-lead TO-8 package.

The avalanche photodiode used in these devices 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 $T_A = +70^\circ \text{C}$	600 V
At $T_A = -40^\circ \text{C}$	300 V
Photodiode Total Current (All temp.)	
Average	100 μA
Peak	100 mA
Preamplifier Voltage:	
Max.	$\pm 12.5 \text{ V}$
Min.	$\pm 5.5 \text{ V}$
Incident Radiant Flux, Φ_M :	
Average value	5.0 μW
Peak value	5.0 mW

Ambient Temperature:

Storage, T_{stg}	$-50 \text{ to } +100^\circ \text{C}$
Operating, T_A	$-40 \text{ to } +70^\circ \text{C}$

Mechanical Characteristics

Type	Diode Chip (Dia.)	Type	Light Pipe Core Dia.
C30950E, EL	C30817 (0.8 mm)	C30950EL	0.50 mm
C30950F, FL	C30902E (0.5 mm)	C30950FL	0.25 mm
C30950G, GL	C30902E (0.5 mm)	C30950GL	0.25 mm

Optical (C30950EL, FL, GL)

Numerical Aperture of Light Pipe	0.60
Refractive Index (η) of Core	1.61

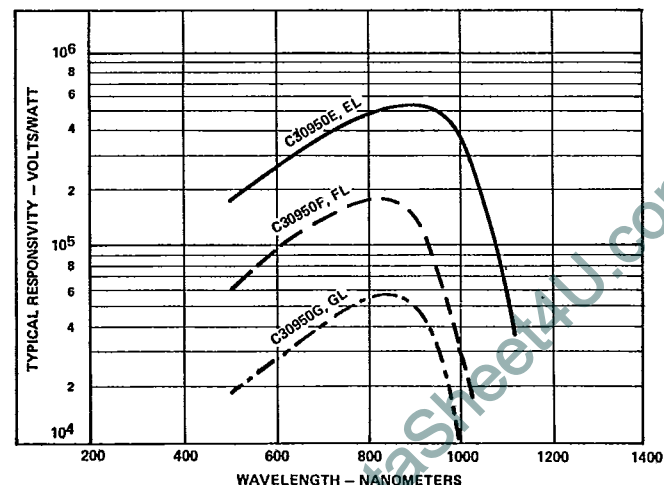


Figure 1 - Typical Spectral Responsivity Characteristics

For further information or application assistance on these devices, contact your RCA Sales Representative or Photodetector Marketing, RCA, Ste Anne de Bellevue, Quebec, Canada H9X 3L3 (514) 457-9000.

Developmental-type devices or materials are intended for engineering evaluation. The type designation and data are subject to change, unless otherwise arranged. No obligations are assumed for notice of change or future manufacture of these devices or materials.

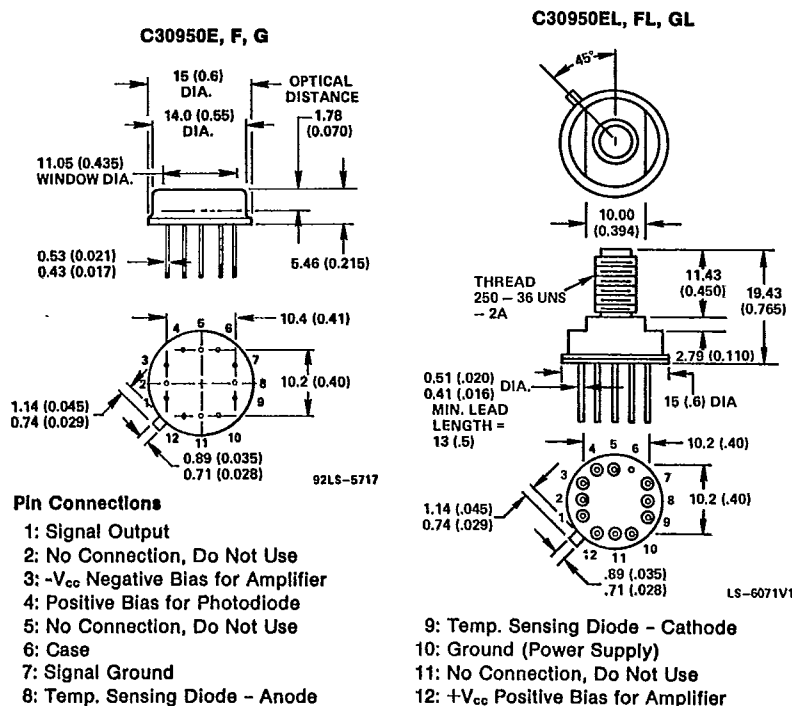
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C30950 Series

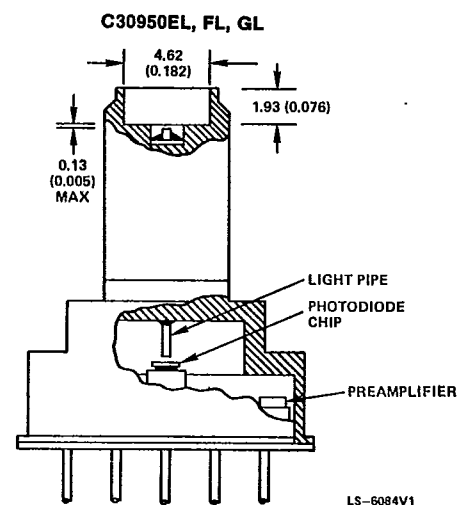
Supersedes C30950E,F,G, & EL,FL,GL, 10-79

Electrical Characteristics at $T_A = 22^\circ\text{C}$ At an ambient temperature (T_A) of 22°C and the DC reverse operating voltage (V_R) value supplied with each device.²

	C30950E, EL			C30950F, FL			C30950G, GL			
	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
Temperature Coefficient of V_R for Constant Gain ³	-	2.2	-	-	0.6	-	-	0.6	-	$V/^\circ\text{C}$
Responsivity:										
At 830 nm	4.5×10^5	5.2×10^5	-	1.7×10^5	1.9×10^5	-	5.3×10^4	5.8×10^4	-	V/W
At 900 nm	4.9×10^5	5.6×10^5	-	1.4×10^5	1.6×10^5	-	4.1×10^4	4.9×10^4	-	V/W
At 1060 nm	1.1×10^5	1.4×10^5	-	-	-	-	-	-	-	V/W
Noise Equivalent Power (NEP):										
$f = 100\text{ kHz}, \Delta f = 1.0\text{ Hz}$										
At 830 nm	-	0.029	0.067	-	0.079	0.180	-	0.260	0.570	$\text{pW/Hz}^{1/2}$
At 900 nm	-	0.027	0.060	-	0.094	0.210	-	0.310	0.730	$\text{pW/Hz}^{1/2}$
At 1060 nm	-	0.110	0.270	-	-	-	-	-	-	$\text{pW/Hz}^{1/2}$
Output Spectral Noise Voltage Density:										
$f = 100\text{ kHz} - 100\text{ MHz},$ $\Delta f = 1.0\text{ Hz}$	-	15	30	-	15	30	-	15	30	$\text{nV/Hz}^{1/2}$
Output Impedance	-	25	50	-	25	50	-	25	50	Ω
System Bandwidth, f_b (3 dB point)	35	50	-	70	100	-	140	200	-	MHz
Rise Time, t_r :										
$\lambda = 900$ and 1060 nm 10% to 90% points	-	7	10	-	4	5	-	2	2.5	ns
Fall Time:										
$\lambda = 900$ and 1060 nm 90% to 10% points	-	7	10	-	4	5	-	2	2.5	ns
Linear Output Voltage Swing	0.5	0.7	-	0.5	0.7	-	0.5	0.7	-	V
Voltage Swing	-	-	2.0	-	-	2.0	-	-	2.0	V
Output Offset Voltage	0.0	-0.8	-1.0	0.0	-0.8	-1.0	0.0	-0.8	-1.0	V
Supply Current	-	4.0	8.0	-	4.0	8.0	-	4.0	8.0	mA

¹ All measurements are made with the device AC (capacitively) coupled into a $50\ \Omega$ termination.² A specific value of V_R is supplied with each device. The voltage values will be within the ranges specified below:
C30950E, EL: 275 - 425 V C30950F, FL, C30950G, GL: 180 - 250 V.³ At 830 and 900 nm.

Dimensions in millimeters. Dimensions in parentheses are in inches.

Figure 2 - Dimensional Outlines**Figure 3 - Cutaway of Package**

Warning - Personal Safety Hazards
Electrical Shock - Operating voltages applied to this device present a shock hazard.