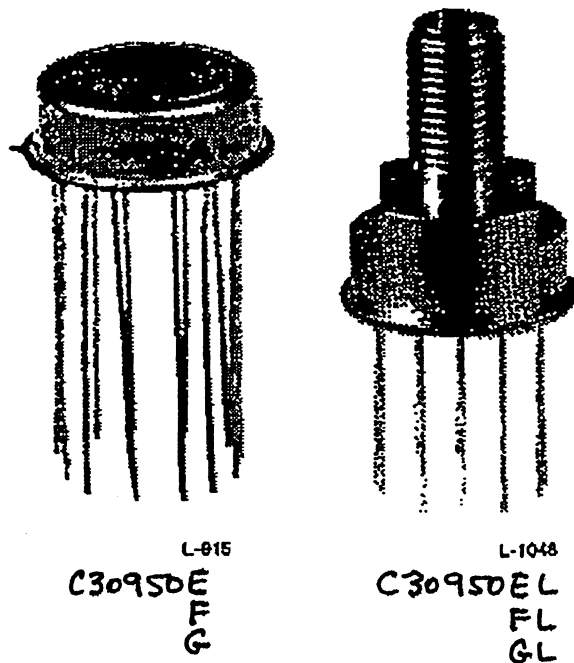


Features:

- System Bandwidth (3 dB Point) : DC to 50 MHz, 100 MHz, 200 Mhz
- System Noise Equivalent Power (NEP) at $T_A = 25^\circ\text{C}$ -
 $2.7 \times 10^{-14} \text{ W/Hz}^{1/2}$ at 900 nm (50 MHz)
 $5.7 \times 10^{-14} \text{ W/Hz}^{1/2}$ at 830 nm (100 MHz)
 $1.2 \times 10^{-13} \text{ W/Hz}^{1/2}$ at 830 nm (200 MHz)
- Spectral Response Range (10% Points): -400 to 1000 nm
- Low Power Consumption (60 mW typ.)
- Wide Range of Amplifier Operating Voltages
- 50 Ω DC coupling capability
- Hermetically-Sealed Modified TO-8 Packages
- Available With Window Cap or Integral Light Pipes
- High Reliability
- Custom bandwidth and detector available on request

Applications:

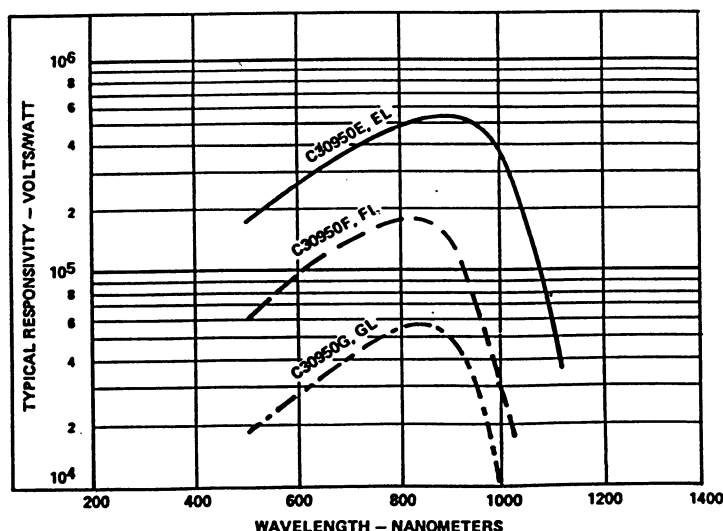
- Range Finding
- Confocal Microscope
- LIDAR



EG&G C30950 Series are using a Developmental Types C30950E, C30950F, and C30950G are Silicon Avalanche Photodiodes with a hybrid preamplifier supplied in a single modified 12-lead TO-8 package. EG&G 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. DC coupling into 50 Ohms is possible when compensating the output offset voltage.



92LS-5917R1

Typical Spectral Responsivity Characteristics

SHEET 1

Absolute-Maximum Ratings, Limiting Values

Photodiode Bias Voltage:

At TA=+70°C.....	600	V
At TA= -40°C.....	300	V

Incident Radiant Flux, Φ_M

Average value	5.0	μ W
Peak value	5.0	mW

Photodiode Total Current (All temp.)

Average	100	μ A
Peak	100	mA

Preamplifier Voltage:

Max	± 12.5	V
Min	± 5.5	V

Ambient Temperature:

Storage, T _{stg}	-50 to +100	°C
Operating, T _A	-40 to + 70	°C

Electrical Characteristics at T_A=22°C

At an ambient temperature (TA) of 22°C, Vcc = ± 6 Volts and the DC reverse operating (VR) value supplied with each device.²

	C30950E, EL			C30950F, FL			C30950G, GL			
	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
Temperature Coefficient of VR for Constant Gain ³	-	2.2	-	-	0.6	-	-	0.6	-	V/°C
V _R for specified responsivity.....	275	NOTE 2	425	180	NOTE 2	250	180	NOTE 2	250	
Responsivity (= R _p [A/W] * Z _T * A _v)										
At 830 nm	4.5x10 ⁵	5.2x10 ⁵	-	2.0x10 ⁵	2.2x10 ⁵	-	5.3x10 ⁵	5.8x10 ⁵	-	V/W
At 900 nm	4.9x10 ⁵	5.6x10 ⁵	-	1.6x10 ⁵	1.8x10 ⁵	-	4.1x10 ⁵	4.9x10 ⁵	-	V/W
At 1060 nm	1.1x10 ⁵	1.4x10 ⁵	-	-	-	-	-	-	-	V/W
Z _T (transimpedance gain)		10K			3.9K			1K		Ω
A _v (Amplifier gain into 50 Ω)		0.75			0.75			0.75		
Noise Equivalent Power (NEP): f = 100 kHz, Δf = 1.0 Hz										
At 830 nm	-	0.029	0.067	-	0.079	0.180	-	0.260	0.570	pW/Hz ^{1/2}
At 900 nm	-	0.027	0.060	-	0.094	0.210	-	0.027	0.730	pW/Hz ^{1/2}
At 1060 nm	-	0.110	0.270	-	-	-	-	0.110	-	pW/Hz ^{1/2}
Output Spectral Noise Voltage Density: f = 100 kHz - f _{3dB}	-	15	35	-	12	30	-	7	15	nV/Hz ^{1/2}
Output Impedance	-	15	50	-	15	50	-	15	50	Ω
System Bandwidth, f _{3dB}	35	50	-	70	100	-	140	200	-	MHz
Rise Time, t _r (λ = 900 and 1060 nm) 10% to 90% points.....	-	7	10	-	4	5	-	2	2.5	ns
Fall Time t _f (λ = 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 Ω termination.

2 A specific value of VR is supplied with each device. The VR value will be within the specified ranges.

3 At 830 and 900 nm.

Mechanical Characteristics

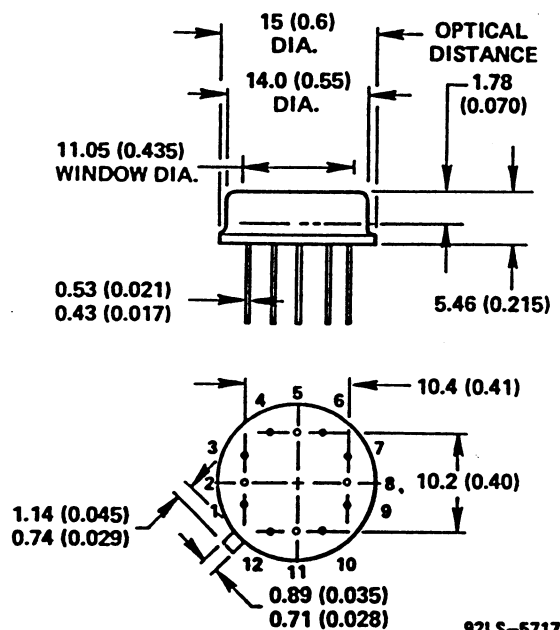
Type	Diode Chip (Dia.)	Light Pipe Core Dia.
C30950E, EL	C30817 (0.8 mm)	0.50 mm (C30950EL)
C30950F, FL	C30902E (0.5 mm)	0.25 mm (C30950FL)
C30950G, GL	C30902E (0.5 mm)	0.25 mm (C30950GL)

Light Pipe Optical Characteristics (C30950EL, FL, GL)

Numerical Aperture of Light Pipe 0.60]

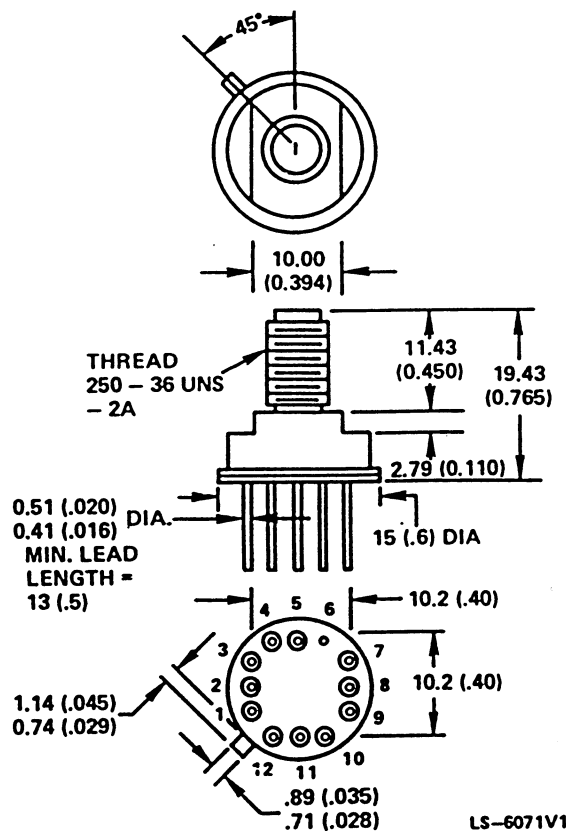
Refractive Index (η) of Core 1.61

C30950E, F, G



92LS-5717

C30950EL, FL, GL



LS-6071V1

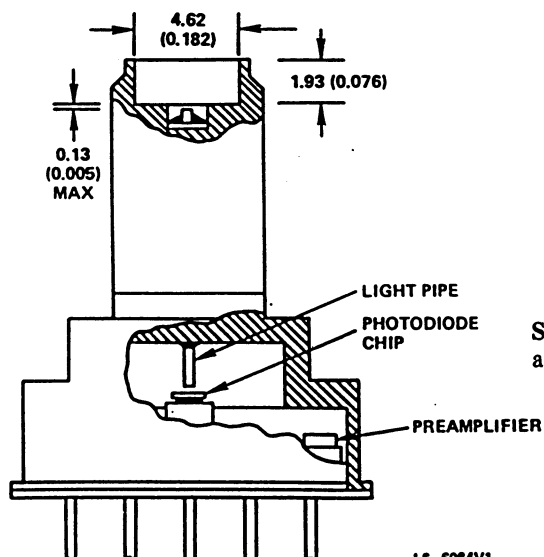
Pin Connections

- 1: Signal Output
- 2: No Connection
- 3: -Vcc Negative Amplifier Bias
- 4: Positive high voltage
- 5: No Connection
- 6: Case Ground
- 7: Input signal Ground
- 8: Temp. Sensing Diode - Anode
- 9: Temp. Sensing Diode - Cathode
- 10: Ground, DC returns
- 11: No Connection
- 12: +Vcc Positive Amplifier Bias.



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

C30950EL, FL, GL



Shock
a shock

SHEET 3

LS-6084V1

Unless otherwise specified: $V_+ = +6V$, $V_- = -6V$, $HV = VR$, $R_L = 50\Omega$ AC coupled.

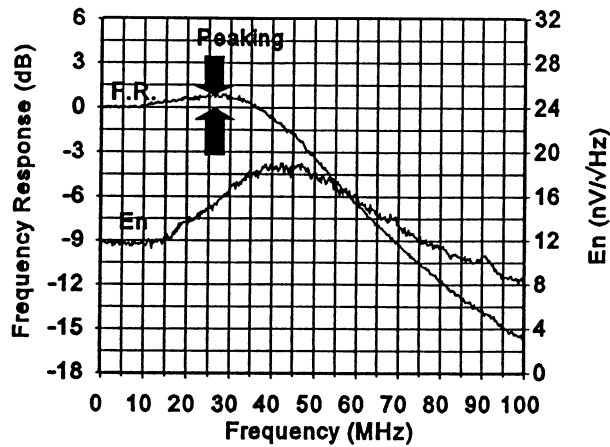


Figure 7: C30950E Freq. Response and Noise

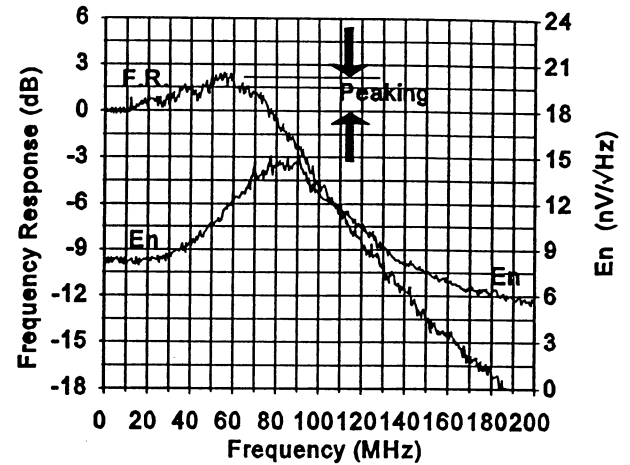


Figure 8: C30950F Freq. Response and Noise

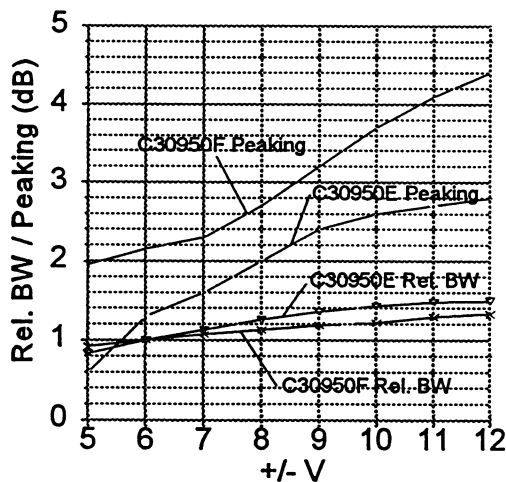


Figure 9: Bias sensitivity

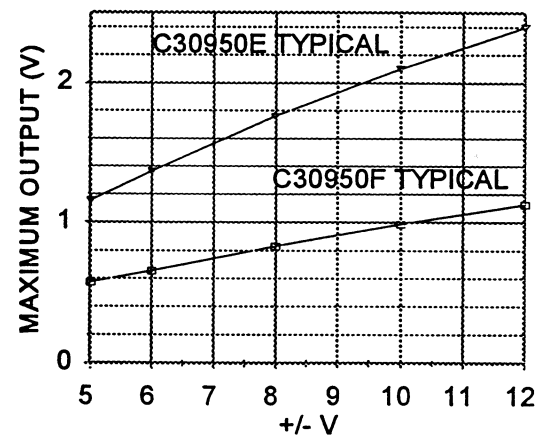


Figure 10: Bias sensitivity

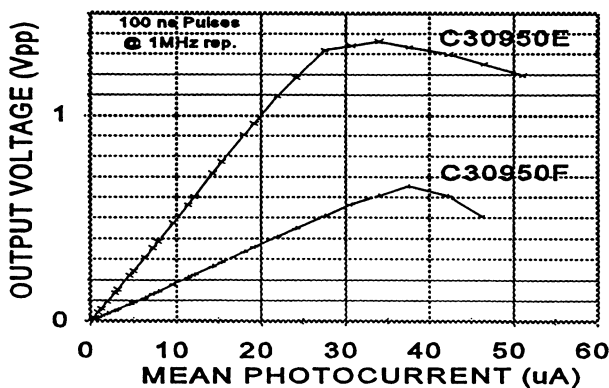


Figure 11: Output Voltage for a Pulsed Optical Input

The V_{pp} in figure 10 and 11 is measured with optical pulses of 100ns wide at a repetition rate of 1 million pulses per second. The V_{pp} of figure 12 is measured with a squarewave optical input of 20 MHz for the C30950E, and 40 MHz for the C30950F.

Output Voltage vs Optical Power

Square wave optical input

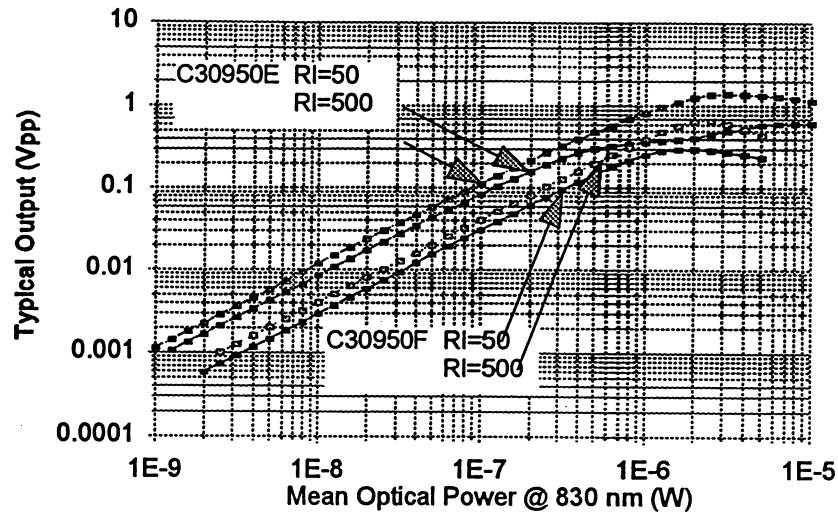


Figure 12: Output signal vs Optical Input Power.

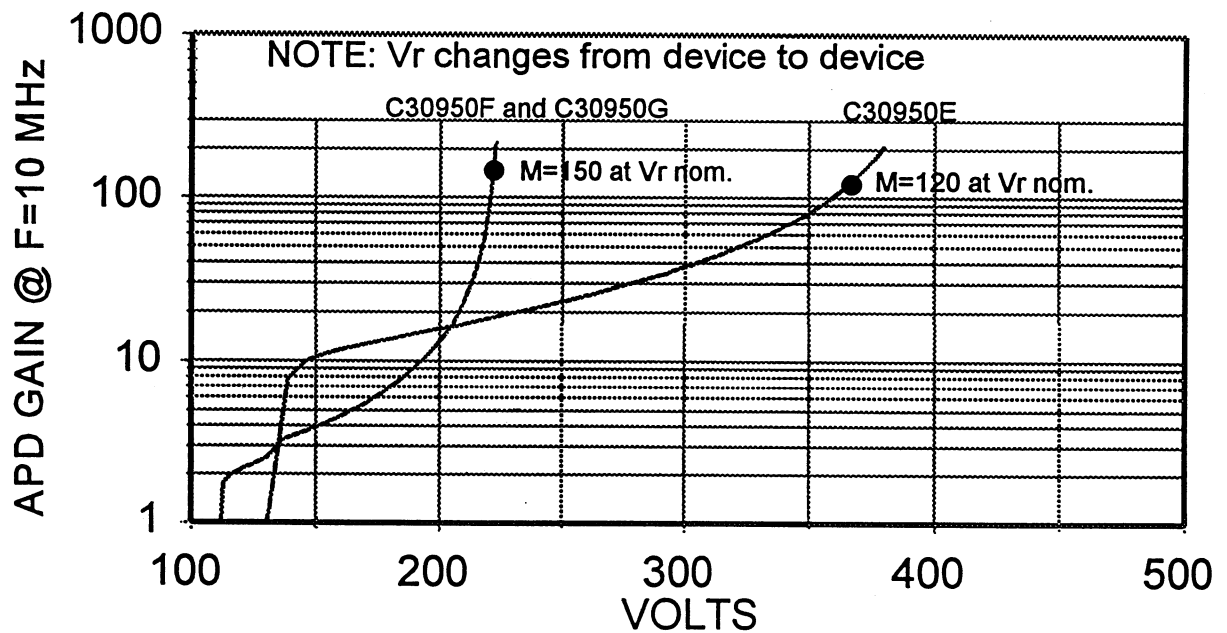


Figure 13: Signal/APD gain vs applied Vr.

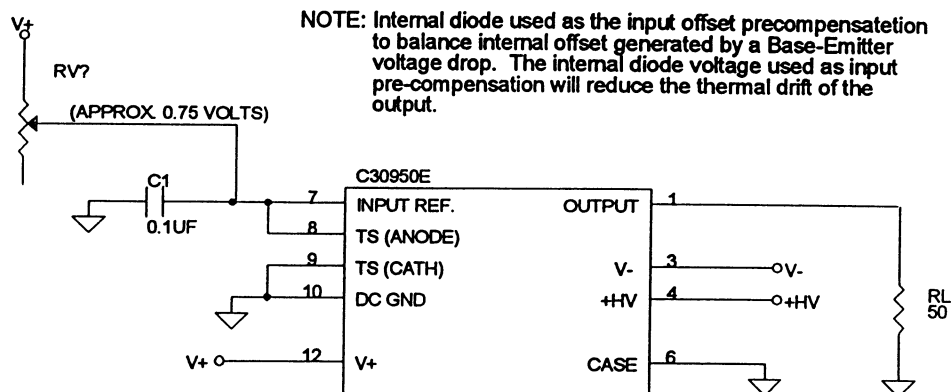


Figure 14: Passive output offset compensation #1

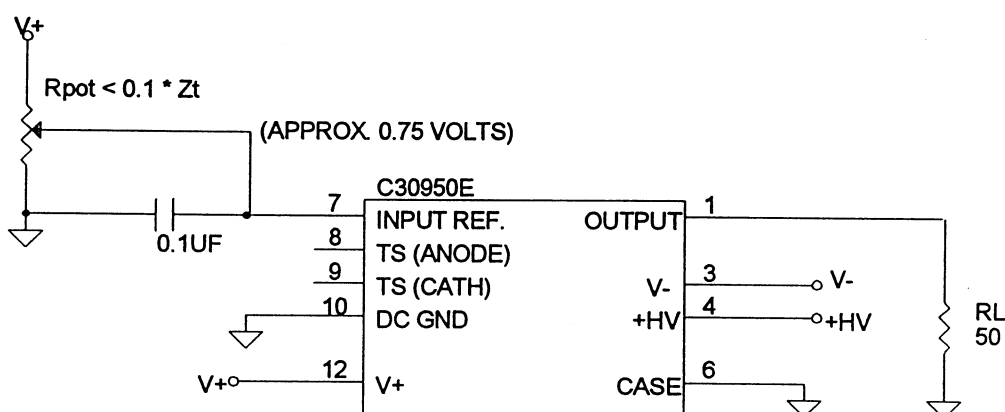


Figure 15: Passive output offset compensation #2

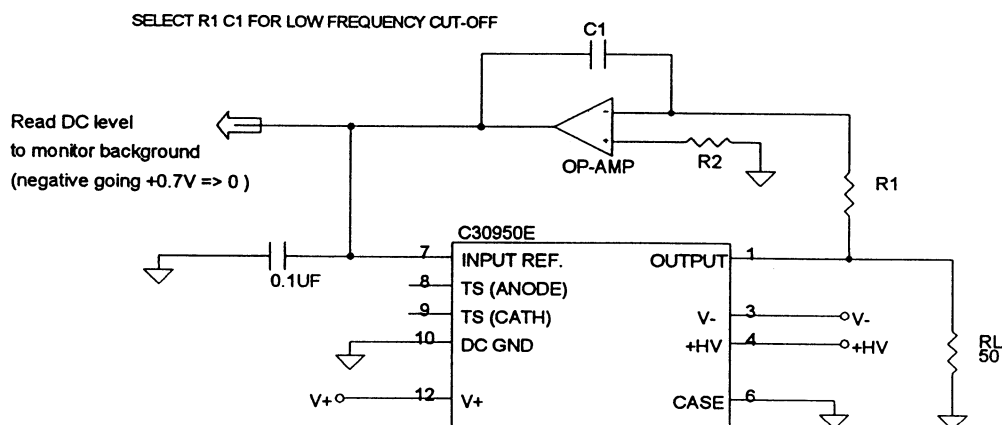


Figure 16: Active output offset compensation.