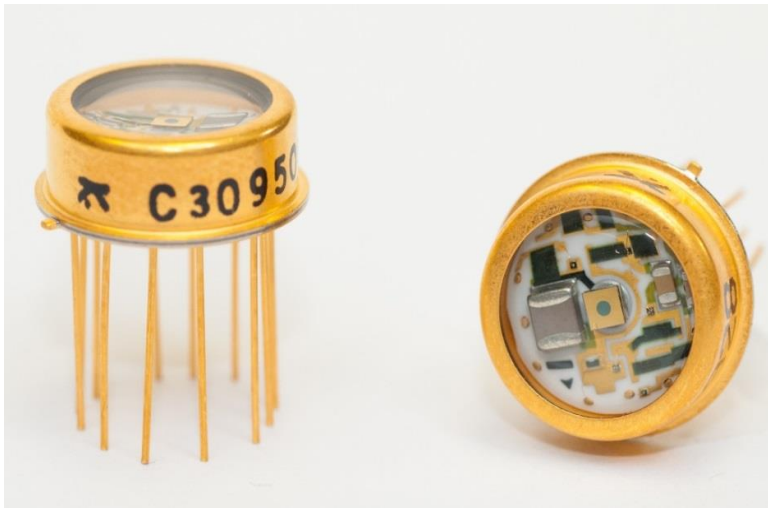


Photodiode C30950EH

Silicon Avalanche Photodiode Preamplifier Module



Overview

The C30950EH is a Silicon Avalanche Photodiode with a hybrid preamplifier supplied in a single modified 12-lead TO-8 package.

The C30817EH avalanche photodiode used in this device is made using a “reach-through” structure which provides very good response between 400 and 1100nm 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 this device should be AC (capacitively) coupled to a 50 Ω termination.

Key Features

- System Bandwidth (3 dB Point) :
DC to 50 MHz, 100 MHz, 200 MHz
- Noise Equivalent Power (NEP) at $T_A = 25^\circ\text{C}$:
0.029 pW/ $\sqrt{\text{Hz}}$ at 900 nm (50 MHz)
0.057 pW/ $\sqrt{\text{Hz}}$ at 830 nm (100 MHz)
0.120 pW/ $\sqrt{\text{Hz}}$ at 830 nm (200 MHz)
- Spectral Response Range (10% Points):
400 to 1000 nm
- Lower Power Consumption (60 mW typ.)
- Wide Range of Amplifier Operating Voltages
- 50 Ω DC coupling capability
- Hermetically-Sealed Modified TO-8 Packages
- High Reliability
- Custom bandwidth and detector available on request

Applications

- Range Finding
- Confocal Microscope
- LIDAR
- Laser designation
- Scanning laser ophthalmoscope

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Table 1. Performance Specifications

Test conditions: Case temperature = 22°C, V_{CC}= ±6 Volts, DC reverse operating (V_{OP}) value supplied with each device¹

Parameter	Symbol	Minimum	Typical	Maximum	Units	Remarks / Conditions
Temperature Coefficient of V _{OP} for Constant Gain ²	V _{op}		2.2		V/°C	
Operating voltage for specified responsivity	V _{op}	275		425		See note 1
Responsivity: at 830 nm at 900 nm at 1064 nm Z _T (transimpedance gain) A _V (amplifier gain into 50Ω)	R	4.5x10 ⁵ 4.9x10 ⁵ 1.1x10 ⁵	5.2x10 ⁵ 5.6x10 ⁵ 1.4x10 ⁵ 10K 0.75		V/W Ω	
Noise Equivalent Power : at 830 nm at 900 nm at 1064 nm (f = 100kHz, Δf = 1.0Hz)	NEP		0.029 0.027 0.110	0.067 0.060 0.270	pW/Hz ^½	
Output Spectral Noise Voltage Density: f = 100 kHz – f _{-3dB} Output Impedance System Bandwidth, f _{-3dB}		35	15 15 50	35 50	nV/Hz ^½ Ω MHz	
Rise/Fall Time, R _L = 50Ω: 10% to 90% points 90% to 10% points (λ = 900 and 1060 nm)	t _r t _f		7 7	10 10	ns 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	
Photosensitive Surface (C30817EH APD): Useful area Useful diameter	A d		0.5 0.8		mm ² mm	

¹ A specific value of V_{OP} is supplied with each device. The V_{OP} value will be within the specified ranges.

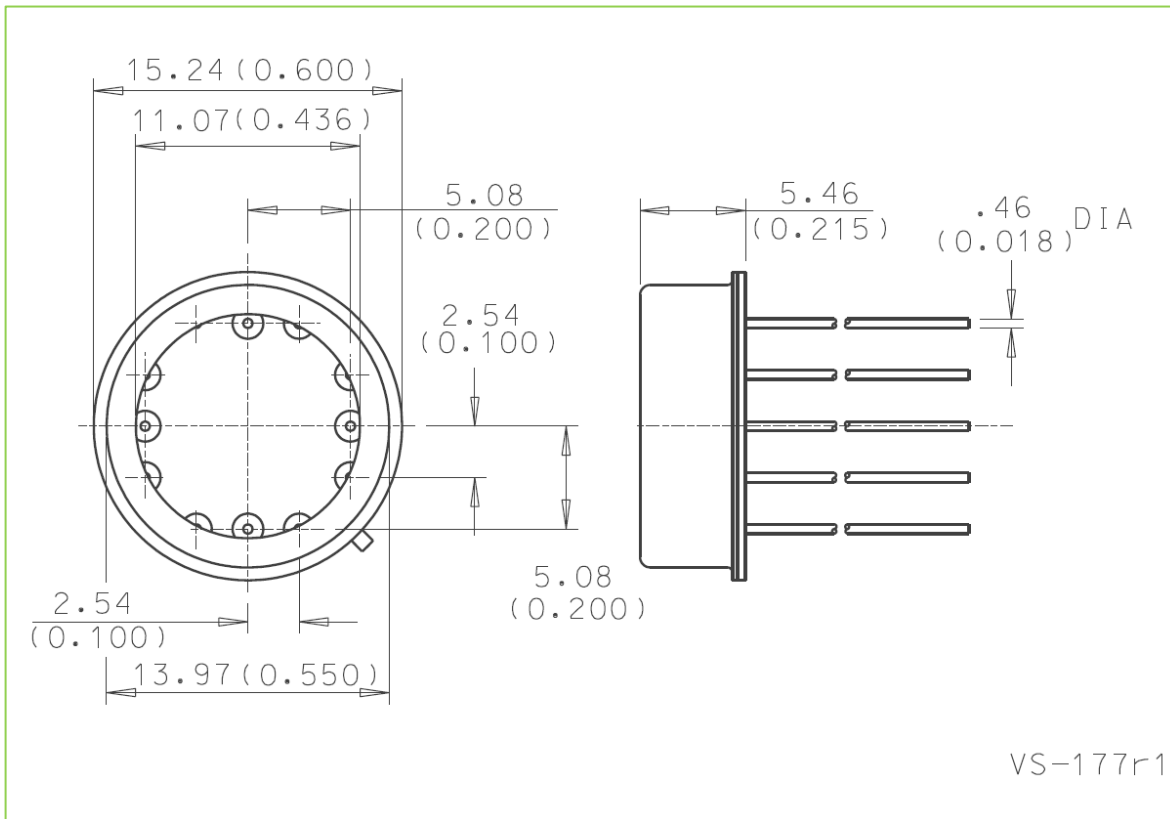
² At 830 and 900 nm.

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Table 2. Absolute – Maximum Ratings, Limiting Values

Parameter	Symbol		Units
Photodiode Bias Voltage: at $T_A=+70^{\circ}\text{C}$ at $T_A=-40^{\circ}\text{C}$		600 300	V
Photodiode Total Current ³ average peak		100 100	μA mA
Storage Temperature	T_{stg}	-50 to +100	$^{\circ}\text{C}$
Operating Temperature	T_o	-40 to +70	$^{\circ}\text{C}$
Incident Radiant Flux average value peak value	Φ_M	5.0 5.0	μW mW
Preamplifier Voltage maximum minimum		± 12.5 ± 5.5	V

Figure 1 – Mechanical characteristics



³ All temperatures

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Figure 2 – Typical Spectral Responsivity Characteristics

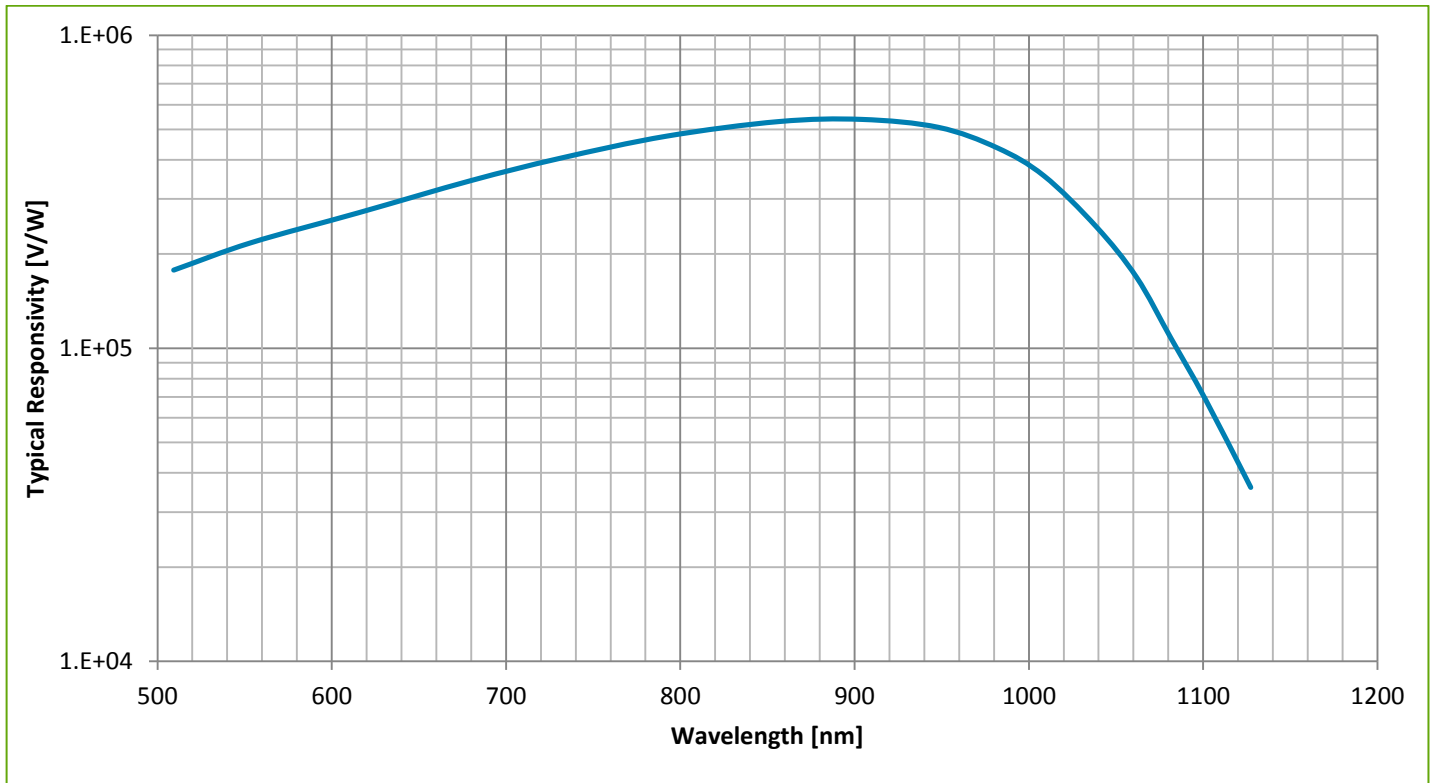
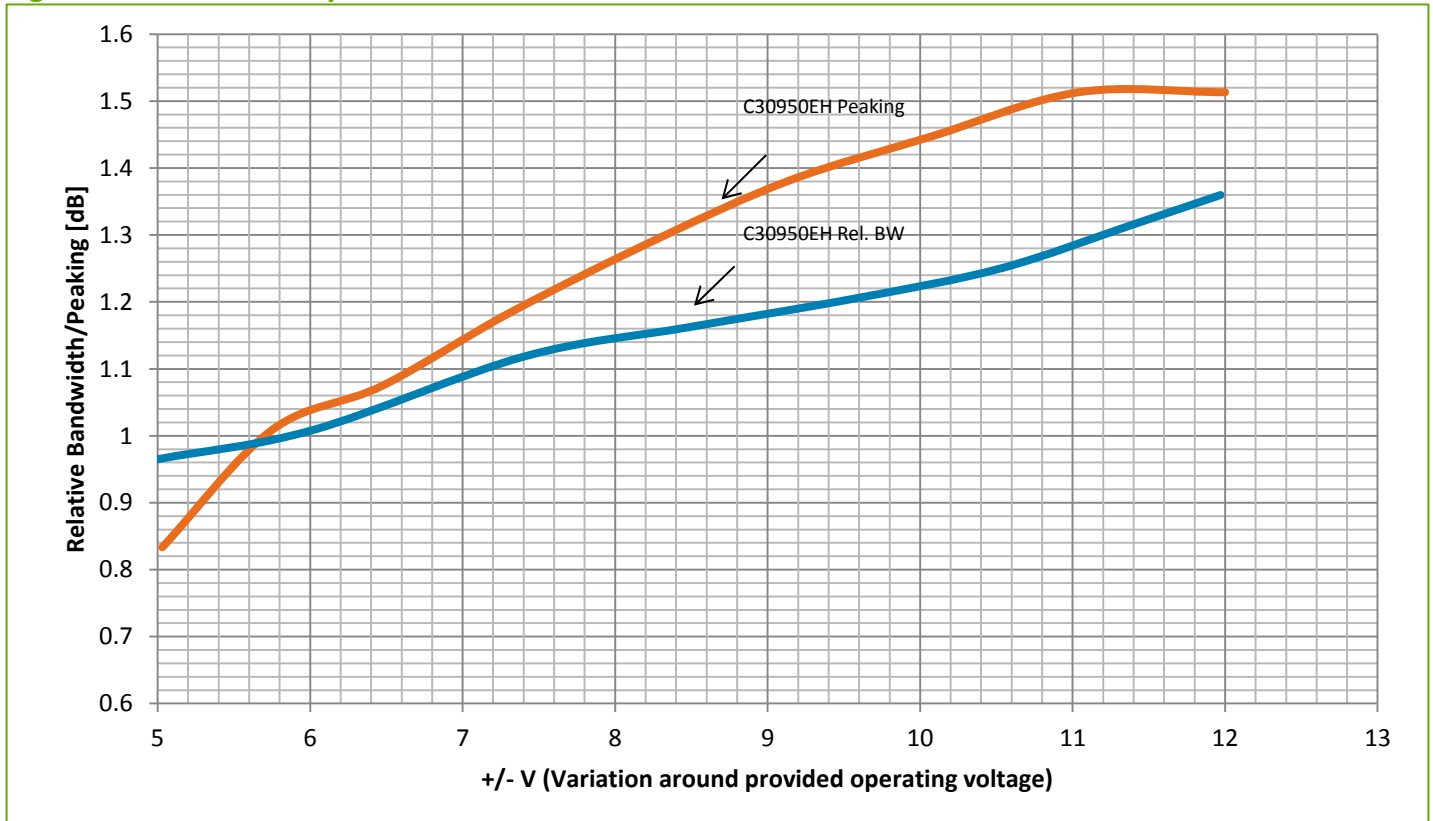


Figure 3 – Bias Sensitivity



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Figure 4 – Bias Sensitivity

The V_{pp} is measured with optical pulses of 100ns wide at a repetition rate of 1 million pulses per second.

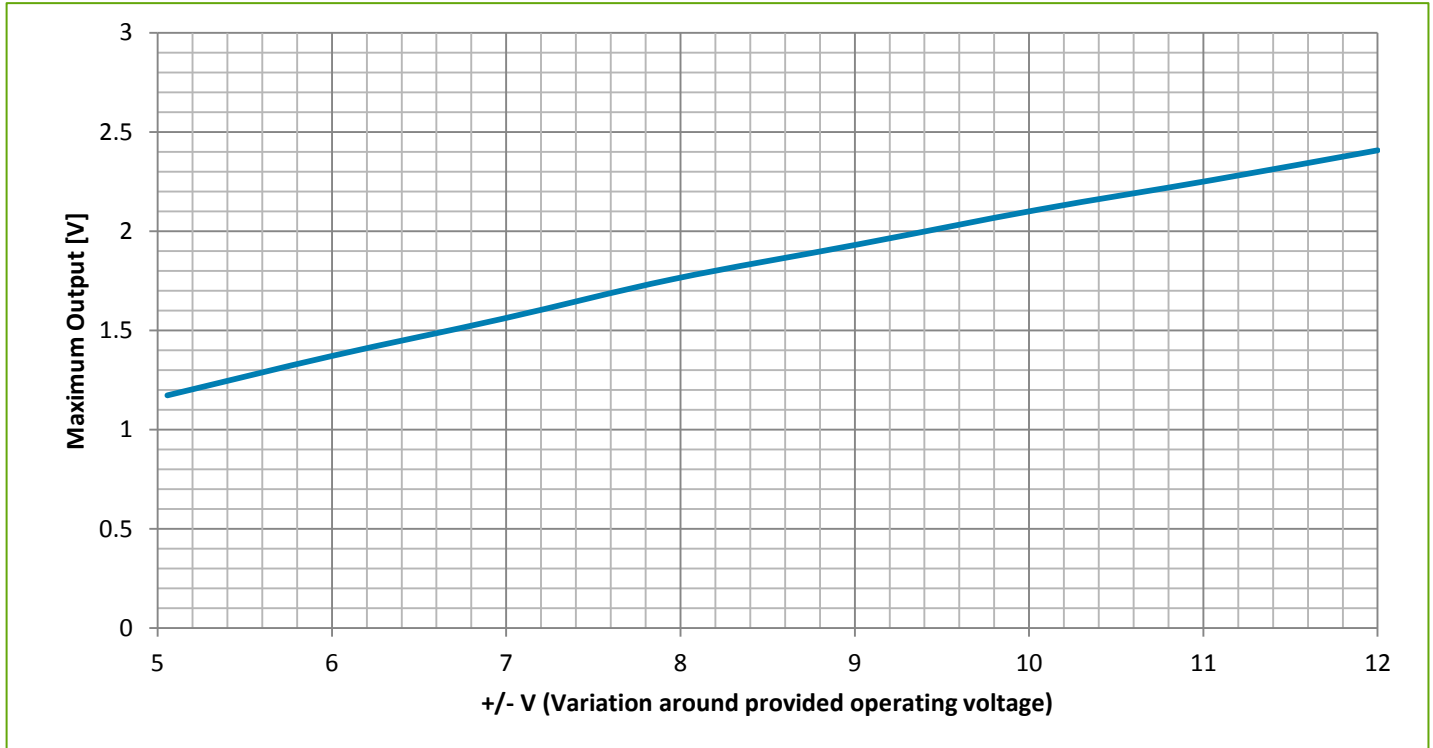
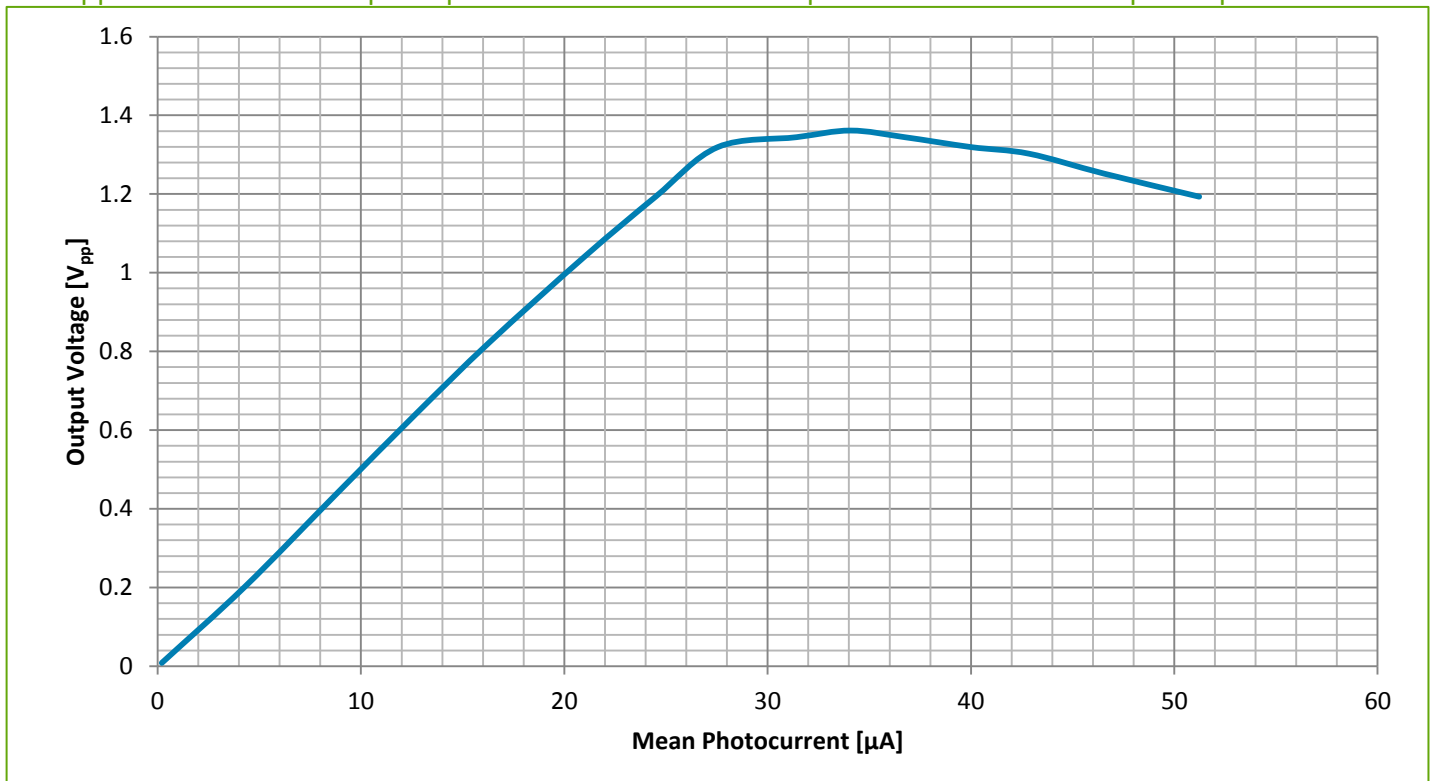


Figure 5 – Output Voltage for a Pulsed Optical Input

The V_{pp} is measured with optical pulses of 100ns wide at a repetition rate of 1 million pulses per second.



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Figure 6 – Output Signal as a function of Optical Input Power
The V_{pp} is measured with a squarewave optical input of 20 MHz.

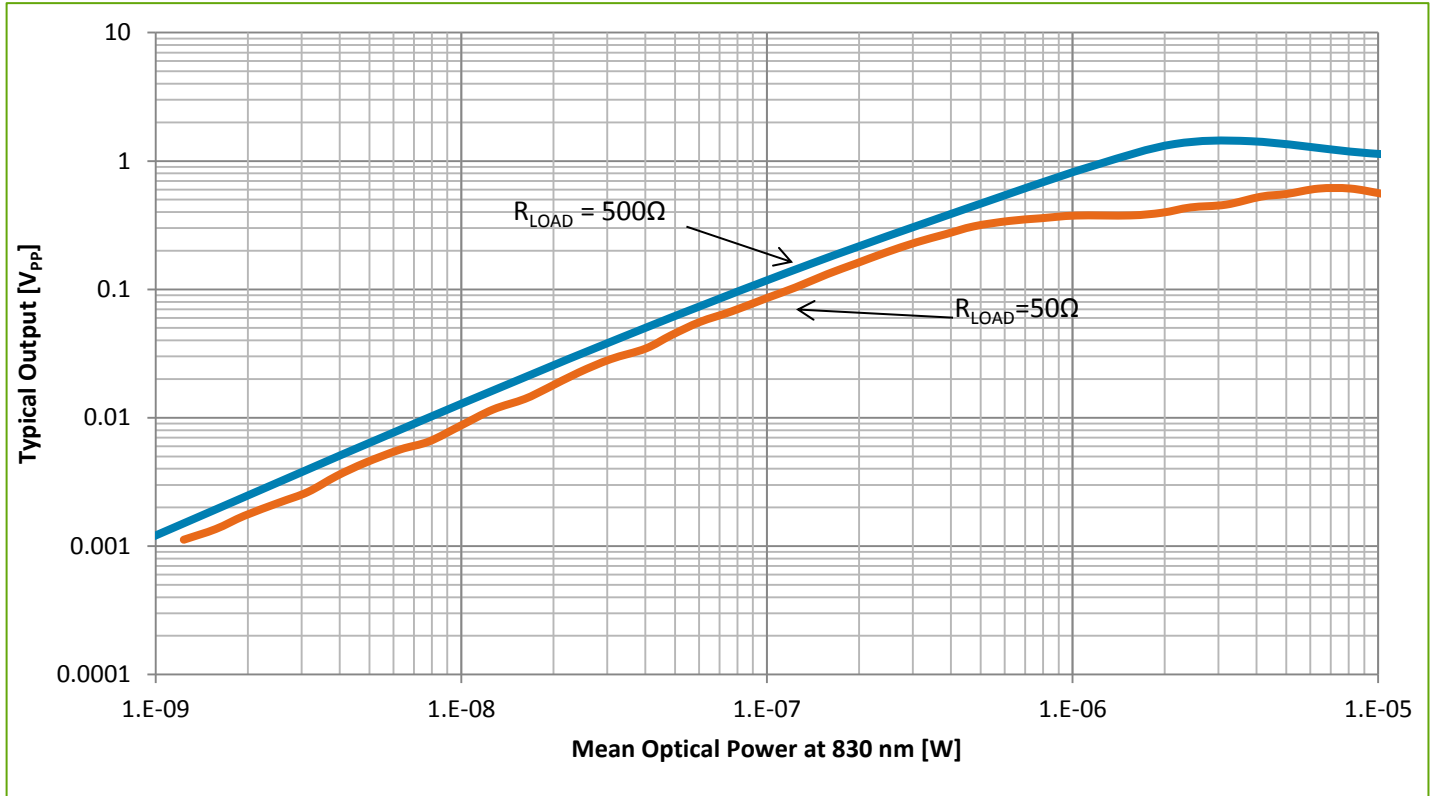
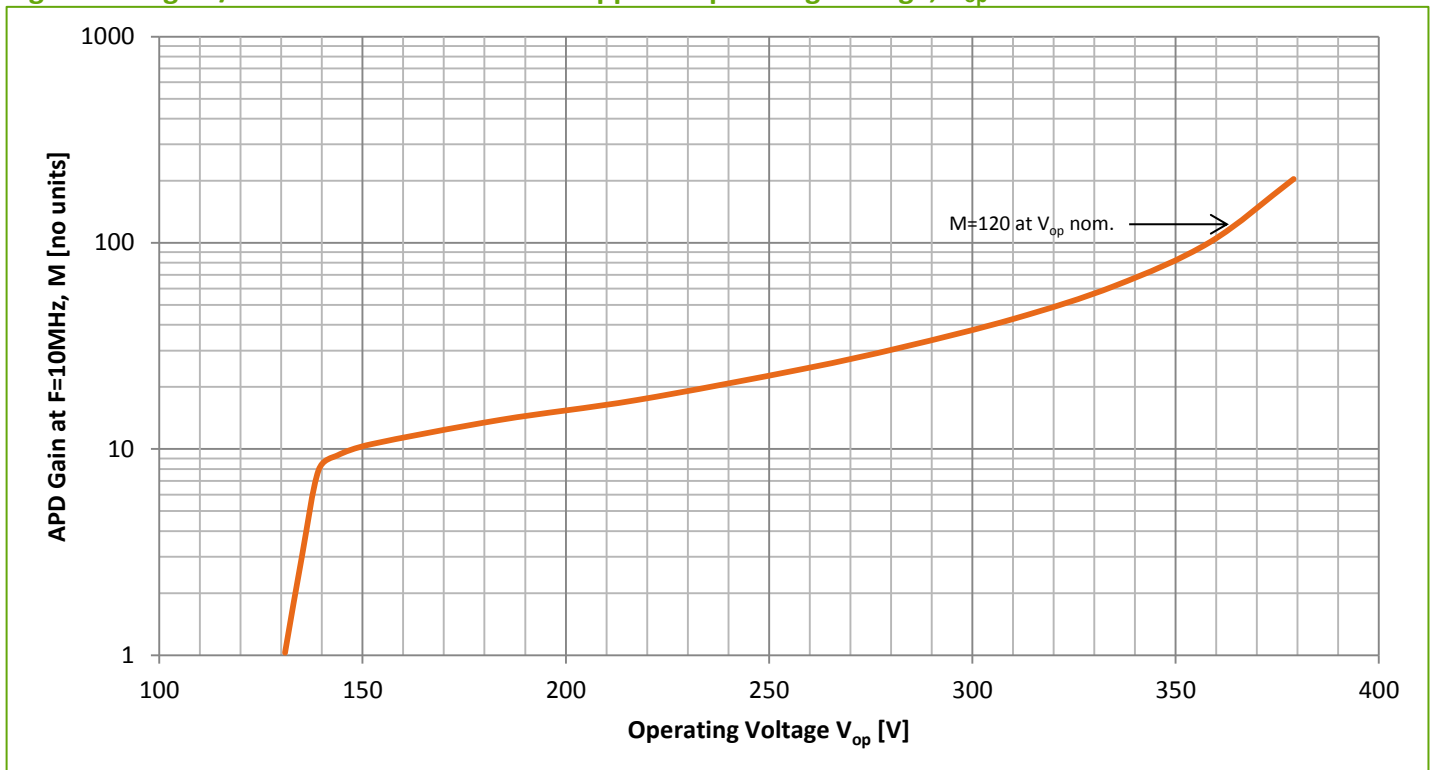


Figure 7 – Signal/APD Gain as a function of Applied Operating Voltage, V_{op} .



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RoHS Compliance

The C30950EH Avalanche photodiode is designed and built to be fully compliant with the European Union Directive 2011/65/EU – Restriction of the use of certain Hazardous Substances (RoHS) in Electrical and Electronic equipment.



Warranty

A standard 12-month warranty following shipment applies. Any warranty is null and void if the photodiode window has been opened.

About Excelitas Technologies

Excelitas Technologies is a global technology leader focused on delivering innovative, customized solutions to meet the lighting, detection and other high-performance technology needs of OEM customers.

Excelitas has a long and rich history of serving our OEM customer base with optoelectronic sensors and modules for more than 45 years beginning with PerkinElmer, EG&G, and RCA. The constant throughout has been our innovation and commitment to delivering the highest quality solutions to our customers worldwide.

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