



C30683-900 Series



Si APD with Transimpedance Amplifier

Excelitas Technologies' C30683-900 series includes a Silicon Avalanche Photodiode (APD) with a TIA, in a hermetically sealed TO-8 package, to allow for low-noise operation. This device is designed for high-speed, extreme low-light detection and free-space optical communication.

The Silicon APD used in the C30683-900 series is the same as used in Excelitas' C30737 series. This detector provide very good response between 400 and 1100 nm and a very fast risetime. The preamplifier section of the module uses a very low noise TIA that can operate at high speeds with a bandwidth up to 420 MHz.

The C30683-900 features an internal thermistor to be used for the temperature compensation of the HV supply to maintain constant responsivity.

Customization of the C30683-900 Series of APD Preamplifier Modules is available to meet your specific design challenges; modifications include bandwidth and gain optimization, use of different APDs, and FC-connectorized packaging.

APPLICATIONS

- Analytical Instrumentation
- LiDAR and Range Finding
- Distributed Temperature Sensing (DTS)
- Confocal Microscopy

YOUR BENEFITS

- Silicon APD integrated with first gain stage in hermetically sealed TO package
- High system bandwidth of 420 MHz
- Low noise equivalent power (NEP) of $37 \text{ fW}/\sqrt{\text{Hz}}$
- High responsivity of 550 kV/W at 900 nm

SPECIFICATIONS

- 500 μm Silicon APD
- Integrated 10K NTC thermistor to monitor APD temperature
- 50 Ω AC load capability (AC-coupled)
- +3.3 V amplifier operating voltage
- Differential Output

Ordering Guide

Model	Nominal Bandwidth	Wavelength Response	APD Model	APD Material	APD Active Diameter
C30683-900-R5DH	400 MHz	900 nm	C30737	Silicon	0.5 mm

Electro-Optical Specifications

All specifications are referring to an ambient temperature of $T_A = 23^\circ\text{C}$, $\lambda = 900\text{ nm}$, $HV = V_{op}$ (see note 1), $V_{amp} = +3.3\text{ V}$, $R_L = 50\ \Omega$ AC coupled unless otherwise specified.

Detector	Parameter	Symbol	C30683-900-R5DH (C30737, 500 μm , 900nm)			Units
			Min	Typ	Max	
Active Diameter		d		0.5		mm
Active Area		A		0.2		mm ²
Bandwidth		B	300	420		MHz
Operating Voltage (note 1)		V_{op}			250	V
Temperature Coefficient of V_{op} for constant gain		$\Delta V/\Delta T$		1.3		V/ $^\circ\text{C}$
Responsivity at 900 nm		R_{900}	400	550		kV/W
Noise Equivalent Power (note 2)		NEP		37	130	fW/ $\sqrt{\text{Hz}}$
Output Spectral Noise Voltage (note 3)		V_n		21	70	nV/ $\sqrt{\text{Hz}}$
Output Impedance		Z	40	50	60	Ω
DC Output Offset Voltage (note 4)		V_{oo}	1.2	1.34		V
Positive Supply Current		I_{amp}		100	120	mA
Thermistor Resistance (note 5)		R_{th}		10 \pm 5%		k Ω

Notes:

1. A specific value of V_{op} is supplied with each device. The V_{op} value will be within the specified range.
2. NEP is calculated as the output spectral noise voltage divided by the typical responsivity and $\Delta f = 1.0\text{ Hz}$ at 900 nm.
3. Average from 100 kHz to f_{-3dB} .
4. Pulsed operation.
5. The temperature of the thermistor in Kelvin can be calculated using the following equation:

$$T[K] = \frac{\beta}{\ln\left(\frac{R_{th}}{r_{\infty}}\right)} \text{ where } \beta = 3890\text{ K}, R_0 = 10000\ \Omega, T_0 = 298.15\text{ K and } r_{\infty} = R_0 e^{\frac{-\beta}{T_0}} \approx 0.0215\ \Omega.$$

Maximum Ratings

Parameter	Symbol	Min	Max	Units
Storage Temperature	T_s	-40	125	$^\circ\text{C}$
Operating Temperature	T_{op}	-40	125	$^\circ\text{C}$

FIG 1. TYPICAL FREQUENCY RESPONSE CURVE

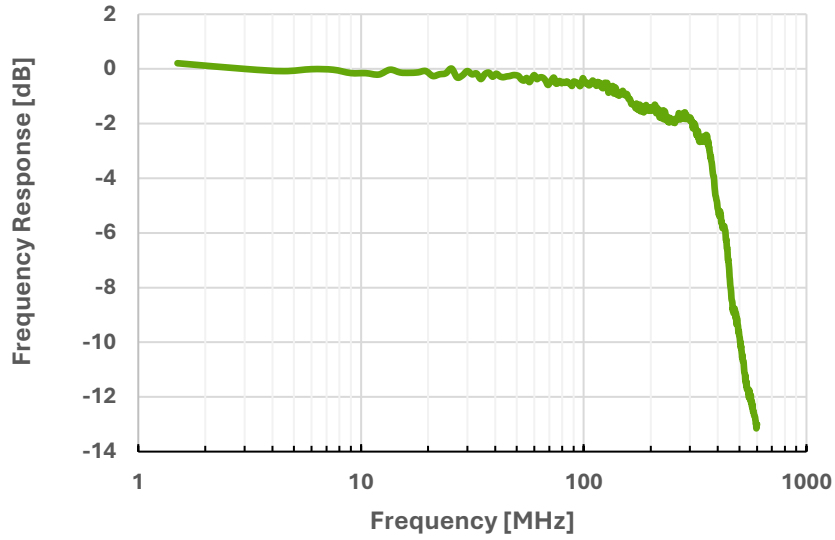
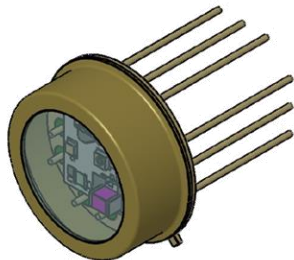
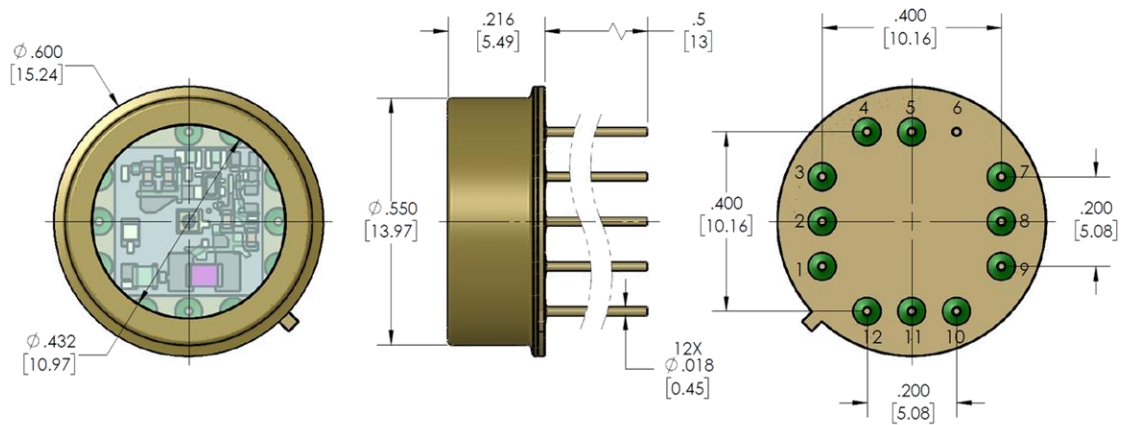


FIG 2. MECHANICAL DIMENSIONS AND PINOUT



PIN OUT DESCRIPTION			
PIN #	DESC	PIN #	DESC
1	NC	7	VCC2
2	VCC1	8	TS2
3	NC	9	TS1
4	OUTN	10	HV-
5	OUTP	11	NC
6	CASE / GND	12	NC

DIMENSIONS ARE IN INCHES [MILLIMETERS]
AND ARE FOR REFERENCE ONLY

Testing and operation methods

Excelitas verifies the electro optical specifications on every device. Hence, a specific voltage, V_{OP} , is supplied with each device. When the device is operated at this voltage (at 22 °C), it will meet the electrical specifications shown above.

Visual inspection during fabrication is performed as per our quality standard and failed parts are removed.

Excelitas Technologies is certified to meet ISO-9001 and are designed to meet MIL-STD-883 and/or MIL-STD-750 specifications.

Packaging and shipping

Parts are shipped in sealed plastic trays.

Storage and handling

Excelitas highly recommends to keep the devices in an ESD controlled environment until final assembly.

RoHS compliance

The C30683-900 series is designed and built to be fully compliant with the European Union Directive on restrictions on the use of certain hazardous substances in electrical and electronic equipment.



Warranty

A standard 12-month warranty following shipment applies



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