

C30683 – Si APD with Integrated TIA

Si APD with Transimpedance Amplifier



Key Features

- 500 μ m Active Area Si APD
- Spectral response 400 nm – 1100 nm
- Si APD with TIA
- Differential output
- High responsivity
- Low noise equivalent power (NEP)
- Hermetically sealed TO package

Applications

- LiDAR
- Ranging
- High-speed, low-light detection
- Analytical instrumentation

Excelitas Technologies' C30683 includes a Si Avalanche Photodiode (APD) with a TIA, in a hermetically sealed TO-8 package, to allow for low noise operation. The Si APD used in this device is the same as used in Excelitas' C30737 series. This APDs provides very good response between 400 and 1100 nm. The C30683 module offers high-speed operation with a BW of up to 400MHz.

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All specifications are referring to an ambient temperature of $T_A = 22\text{ }^{\circ}\text{C}$, $\lambda = 900\text{ nm}$, $M = 100$, $HV = V_{op}$ (see Note 1), $V_{amp} = +3.3\text{ V}$, $R_L = 50\text{ }\Omega$ AC coupled unless otherwise specified.

Table 1: Electro-Optical Specifications

Detector Type	C30683-900-R5DH (C30737, 500um, 900nm APD)			
Parameter	Min	Typical	Max	Units
Active diameter		0.5		mm
Active area		0.2		mm ²
System bandwidth, f_{-3dB}	300	400		MHz
Temperature coefficient of V_{op} for constant gain		1.3		V/ $^{\circ}\text{C}$
V_{op} for specified responsivity		Note 1	250	V
Responsivity at 900 nm		550		kV/W
Noise equivalent power (NEP) (Note 2) Average from 100 kHz to f_{-3dB} , $\Delta f = 1.0\text{ Hz}$ at 900 nm		37		fW/ $\sqrt{\text{Hz}}$
Output spectral noise voltage Averaged from 100 kHz to f_{-3dB}		21		nV/ $\sqrt{\text{Hz}}$
Output impedance	40	50	60	Ω
DC output offset voltage (50 Ω load) (Note 3)	1.2	1.34		V
Positive supply current (V_{amp})		100	120	mA
Thermistor value (Note 4)		5.1 $\pm$ 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.
3. Pulsed operation.
4. The temperature of the thermistor in Kelvin can be calculated using the following equation:

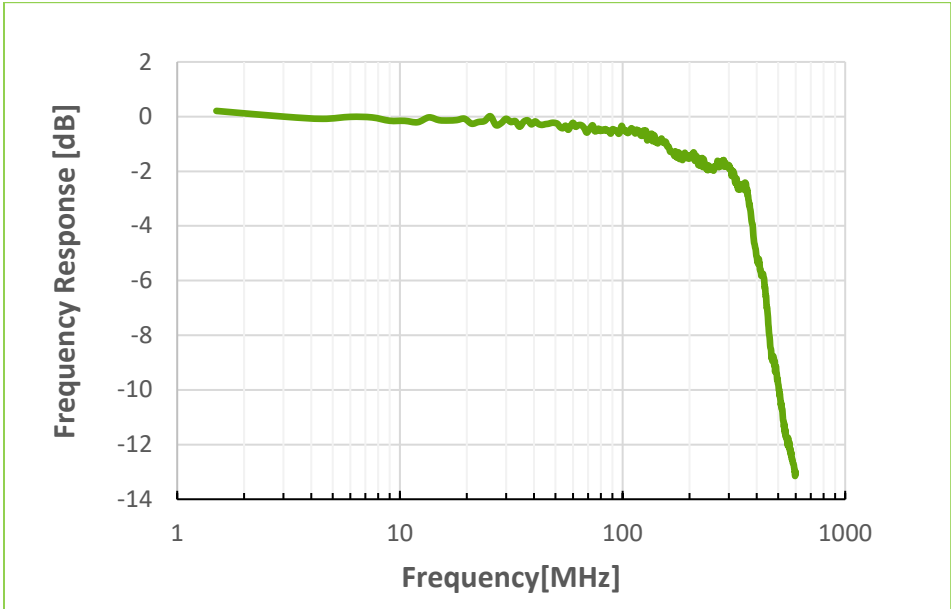
$$T[K] = \frac{\beta}{\ln\left(\frac{R}{r_{\infty}}\right)}, \text{ where } R \text{ is the measured thermistor resistance in } \Omega,$$

$$\beta = 3200, R_0 = 5100\text{ }\Omega, T_0 = 298.15\text{ K and } r_{\infty} = R_0 e^{-\frac{\beta}{T_0}} \cong 0.1113.$$

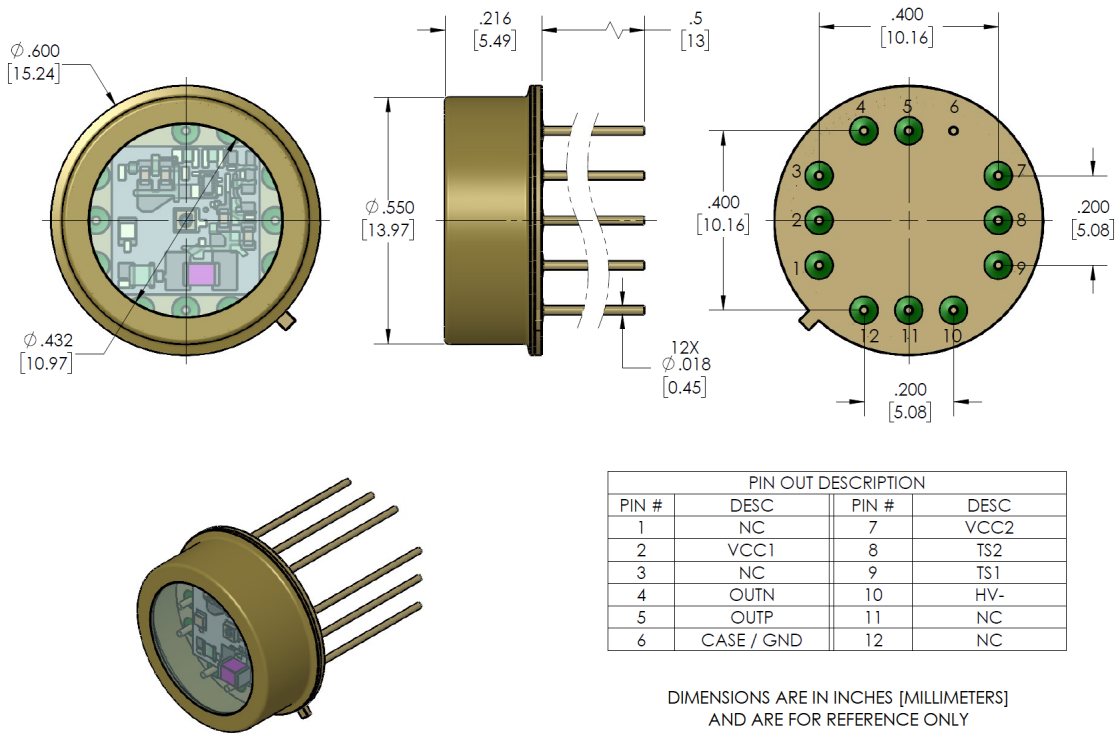
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Typical Frequency response curves



Mechanical Drawing and Device Pinout



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RoHS Compliance

This series of APD diodes is fully compliant with the European Union Directive on restrictions of the use of certain hazardous substances in electrical and electronic equipment.



Warranty

A standard 12-month warranty following shipment applies.

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.

From aerospace and defense to analytical instrumentation, clinical diagnostics, medical, industrial, and safety and security applications, Excelitas Technologies is committed to enabling our customers' success in their specialty end-markets. Excelitas Technologies has approximately 7,000 employees in North America, Europe, and Asia, serving customers across the world.

Excelitas Technologies

22001 Dumberry Road
Vaudreuil-Dorion, Quebec
Canada J7V 8P7
Telephone: (+1) 450.424.3300
Toll-free: (+1) 800.775.6786

Excelitas Technologies

GmbH & Co. KG
Wenzel-Jaksch-Str. 31
D-65199 Wiesbaden
Germany
Telephone: (+49) 611 492 430

Excelitas Technologies Singapore, Pte. Ltd.

8 Tractor Road
Singapore 627969
Telephone: (+65) 6775 2022 (Main number)
Telephone: (+65) 6770 4366 (Customer Service)



Contact us at <http://www.excelitas.com/contact>

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