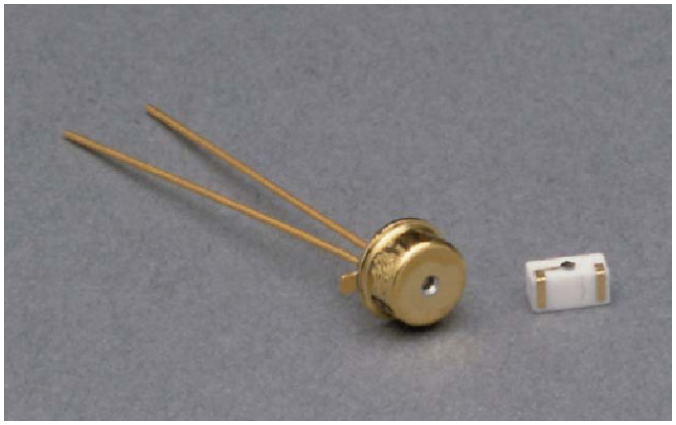
DATASHEET

C30645 and C30662 Series

Large Area InGaAs Avalanche Photodiodes for 1550 nm eye-safe laser range finding applications



Overview

The C30645 and C30662 Series APDs are high speed, large area InGaAs/InP avalanche photodiodes. These devices provide large quantum efficiency. (Q.E.), high responsivity and low noise in the spectral range between 1100 nm and 1700 nm. They are optimized for use at a wavelength of 1550 nm, suitable for use in eye-safe laser range finding systems.

These APDs are supplied in a hermetically sealed TO-18 package or on a ceramic carrier. Custom packaging is also available. Please contact Excelitas to discuss the packaging in further detail. Excelitas Technologies is committed to supplying the highest quality product to our customers.

We are certified to meet ISO-9001 and we are designed to meet MIL-STD-883 and/or MIL-STD-750 specifications.

All devices undergo extended burn-in and periodic process qualification programs to assure high reliability.

Features and Benefits

- Spectral response 1100 to 1700 nm
- High responsivity
- Low dark current and noise
- Large area
- RoHS-compliant

Applications

- OTDR
- Eye-safe laser range finding systems

Table 1: Electrical Characteristics at T_A = 22°C

	C30645			C30662			C30662-1				Conditions
Parameter	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Units**	
Active Diameter		80			200			200		µm	
Breakdown voltage (V_{BR})	45	75	95	45	75	95	45	75	95	V	
Operation Point from Breakdown (V_{BR}-V_{op})							4.0			V	At gain of 10 (M=10) **(See Note 6)**
Temperature Coefficient of V_r for Constant Gain		0.14	0.20		0.14	0.20				V / deg C	
Responsivity (@ 1550 nm)	9.3			9.3						A/W	
Dark Current (@ M=10)			50			150				nA	
Spectral Noise Current (@ M=10)			1.0			1.5				pA/rt (Hz)	
Capacitance		1.25			2.5					pF	
Bandwidth (@ M=10)	1000			600	850					MHz	
Quantum Efficiency (1300-1550 nm)	75			75						%	
Maximum Useable Gain (M)	10	20		10	20					No units	

1. A specific voltage, V_{op}, is supplied with each device. When the photodiode is operated at this voltage (at 22 °C), the device will meet the electrical characteristic limits shown above. The voltage value will be within the range of 40 to 95 volts.

2. The voltage dependence of the gain, M, for gains above 4, is given approximately by the following empirical formula yielding a rough approximation of the sensitivity:
   $M = 50/(V_{BR}-V_{op})$.

3. Gain and quantum efficiency are not directly measurable quantities. The numbers quoted are estimated typical values. Gain, quantum efficiency and responsivity are related by the following: $R = \eta\lambda M / 1.24$
   where λ is the wavelength in units of mm, η is the quantum efficiency, M is gain.

4. The detector noise current / rt(Hz) is given by the following expression:
   $I_n = (2q\,(I_s + I_b M^2 F))^{1/2}$

   Where: $F = k_{eff}M + (1 - k_{eff})(2-1/M)$ and I_s and I_b are the un-multiplied and multiplied portions of the dark current, respectively. The total dark current is given by: $I_t = I_s + IbM$.

   However, since both I_s and I_b are somewhat voltage dependent, and M is not directly measurable (see Note 3), it is not usually possible to determine both I_s and I_b unambiguously. Since system performance depends on noise current and responsivity, these measurable quantities are the ones that have been specified.

5. Most devices can be operated at gains up to about 30 or more, but with values of noise current correspondingly higher, as indicated by the discussion in Note 4 above.

6. The product C30662EH can be ordered with specified operation voltage bias from the voltage breakdown (V_{BR}-V_{op}), also known as deltaV or dV. Using the "-1" suffix specifies a dV larger than 4 V. Please contact us for more information.

Table 2: Absolute Maximum Rating, Limiting Values

	Parameter	**Units**
Forward Current	5	mA
Total Power dissipation	20	mW
Operating Temperature	-60 to +125	°C
Storage Temperature	-20 to +70	°C
Soldering Temperature (10 seconds)	250	°C

Table 3: Ordering Guide

Model	Package Type
C30645EH	Standard TO-18
C30645CCERH	Ceramic Carrier
C30662EH	Standard TO-18
C30662EH-1	Standard TO-18, dV larger than 4.0V
C30662ECERH	Ceramic Carrier
C30662ECERH-1	Ceramic Carrier, dV larger than 4.0V

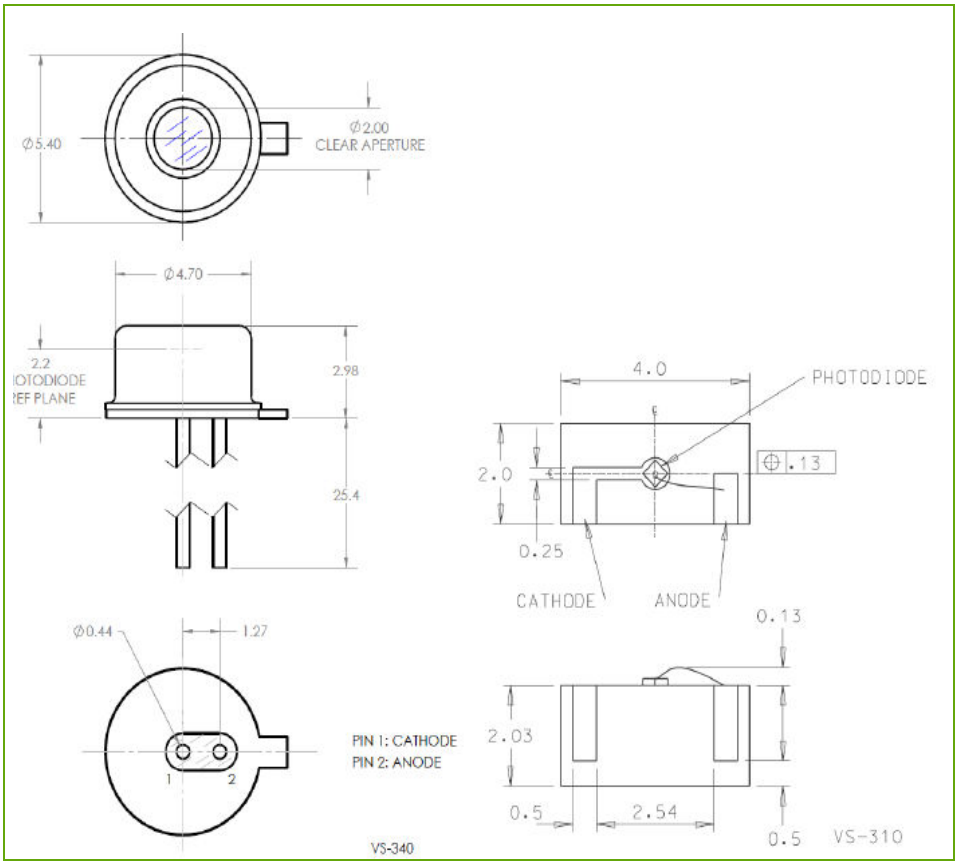


Figure 1
Mechanical Characteristics

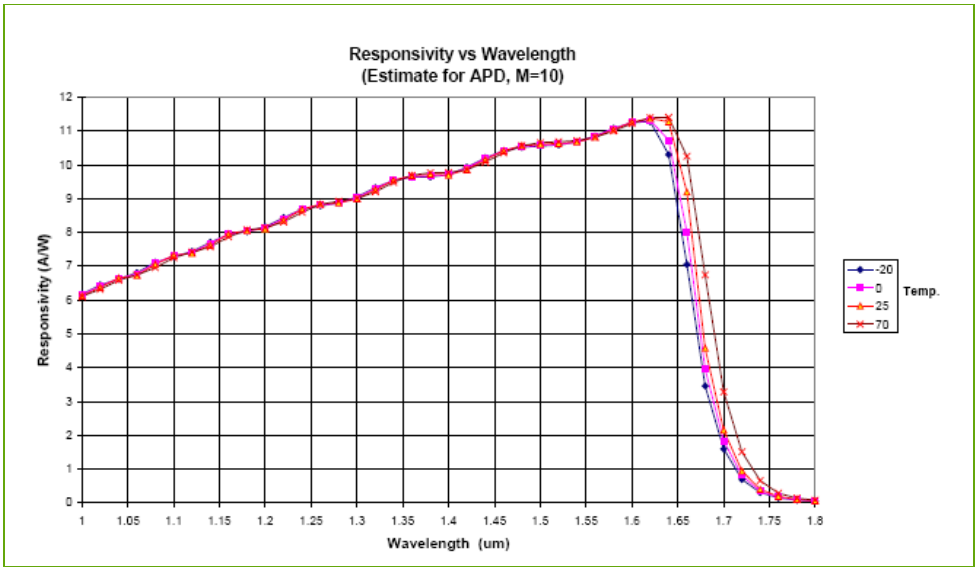


Figure 2
Spectral Responsivity Curve

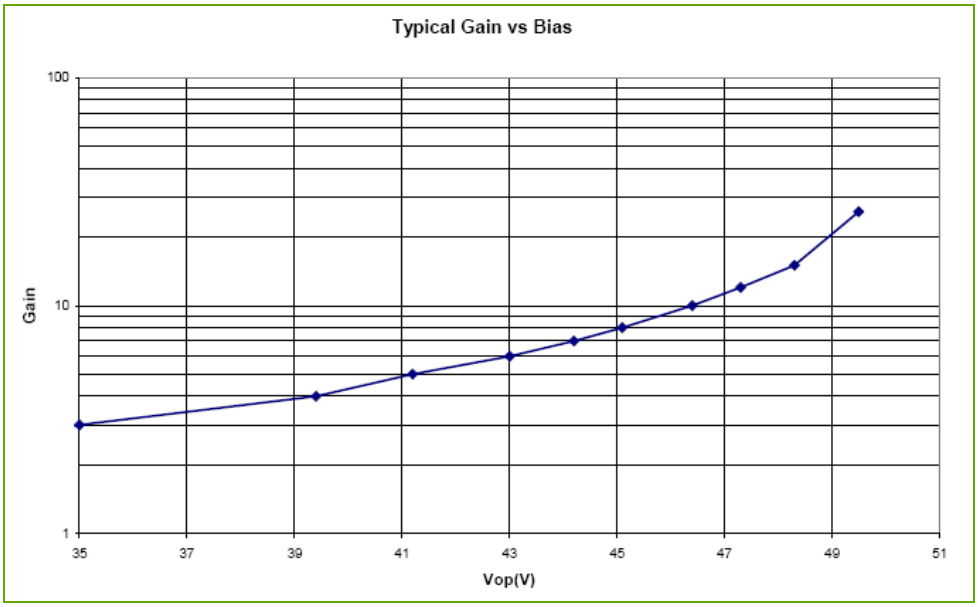


Figure 3
Typical Gain vs. Bias

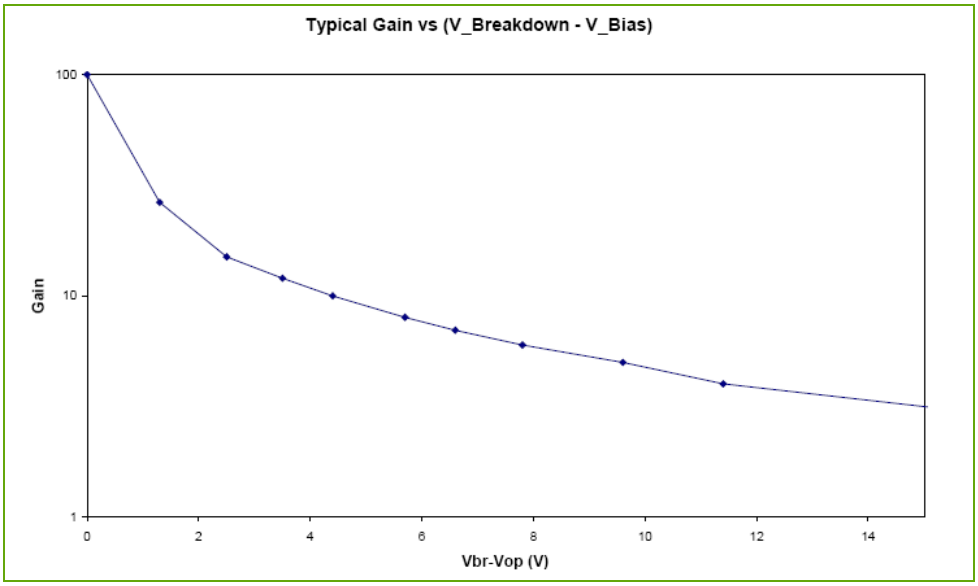


Figure 4
Typical Gain vs.dV
(V breakdown - V bias)

Excelitas Technologies
22001 Dumberry Road
Vaudreuil-Dorion, Quebec
Canada J7V 8P7
Telephone: (+1) 450.424.3300
Toll-free: (+1) 800.775.6786
Fax: (+1) 450.424.3345

Excelitas Technologies GmbH & Co. KG
Wenzel-Jaksch-Str. 31
D-65199 Wiesbaden
Germany
Telephone: (+49) 611 492 430
Fax: (+49) 611 492 165

Excelitas Technologies
47 Ayer Rajah Crescent #06-12
Singapore 139947
Telephone: (+65) 6775 2022
Fax: (+65) 6775 1008

For a complete listing of our global offices, visit www.excelitas.com/Detection

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