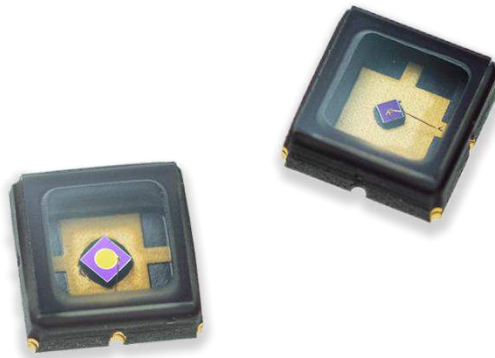


C30617L-100 and C30618L-350 – InGaAs PIN Photodiodes

High Speed InGaAs PIN on Ceramic Surface Mount Substrate



Excelitas' C30617L-100 and C30618L-350 PIN Diodes are high speed, InGaAs diodes that provide high responsivity for high speed applications.

Key Features

- High Bandwidth, up to 3.5 GHz
- High responsivity at 1300 nm and 1550 nm
- Active Area diameter of 100 μm and 350 μm
- Low capacitance
- Compact, robust ceramic SMT package
- Customizations (e.g. filters) possible
- RoHS compliant

Applications

- High volume consumer applications
- LiDAR
- Telecommunication
- Instrumentation
- High speed switches
- Optical time reference for laser range finders

All specifications are referring to an ambient temperature of $T_A = 22\text{ }^\circ\text{C}$, $\lambda = 1550\text{ nm}$ and typical V_{OP} .

Table 1: Key parameters

Parameter	Symbol	Min	Typ	Max	Unit
Operating Voltage	V_{OP}	1	5	10	V
Spectral Range	$\Delta\lambda$	960		1700	nm
Peak Responsivity	λ_{peak}		1550		nm
Responsivity	R_{1300}	0.80	0.90		A/W
	R_{1550}	0.95	1.05		

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Table 2: Ordering Information

Parameter	C30617L-100	C30618L-350	Units
Active Area Shape	Circular	Circular	
Useful Area	7850	96200	μm^2
Useful Diameter	100	350	μm

Table 3: Absolute Maximum Ratings

Parameter	Symbol	Value	Units
Average Forward Current	I_F	10	mA
Total Power dissipation	P_{tot}	100	mW
Storage Temperature	T_S	-60 ... 125	$^{\circ}\text{C}$
Operating Temperature	T_{Op}	-40 ... 125	$^{\circ}\text{C}$
Soldering Temperature ³	T_P	250	$^{\circ}\text{C}$

Note 1: Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device.

Note 2: Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Note 3: For detailed reflow information, refer to Table 8.

Table 4: Optical Specifications C30617L-100

Parameter	Symbol	Minimum	Typical	Maximum	Units
Rise Time / Fall Time	t_r / t_f		0.07	0.50	ns
Bandwidth	$f_{3\text{dB}}$		3.50		GHz

Table 5: Optical Specifications C30618L-350

Parameter	Symbol	Minimum	Typical	Maximum	Units
Rise Time / Fall Time	t_r / t_f		0.50	1.00	ns
Bandwidth	$f_{3\text{dB}}$		0.75		GHz

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Table 6: Electrical Specification C30617L-100

Parameter	Symbol	Minimum	Typical	Maximum	Units
Breakdown Voltage	V_{BD}	25	60		V
Capacitance	C		0.6	1.0	pF
Dark Current	i_D		<1.0	4.0	nA
Dark Noise ¹	i_N		<0.03	0.15	pA/√Hz
Noise Equivalent Power ²	NEP		<0.03		pW/√Hz

Table 7: Electrical Specification C30618L-350

Parameter	Symbol	Minimum	Typical	Maximum	Units
Breakdown Voltage	V_{BD}	25	60		V
Capacitance	C		4.0	6.0	pF
Dark Current	i_D		<1.0	5.0	nA
Dark Noise ¹	i_N		<0.08	0.20	pA/√Hz
Noise Equivalent Power ²	NEP		<0.08		pW/√Hz

Note 1: Due to the natural fluctuations of charge carriers the PIN diode will also generate noise when not illuminated. Since the noise characteristics and hence the signal-to-noise ratio (SNR) are depending on the bandwidth (f_{3dB}) and used wavelength (λ) in the final system the illuminated noise

$$i_{ill} = \sqrt{2qf_{3dB}(i_D + R(\lambda)P)}$$

needs to be considered. Hence the SNR defines as

$$SNR = \frac{i_p^2}{i_{ill}^2} = \frac{(PR(\lambda))^2}{i_{ill}^2}$$

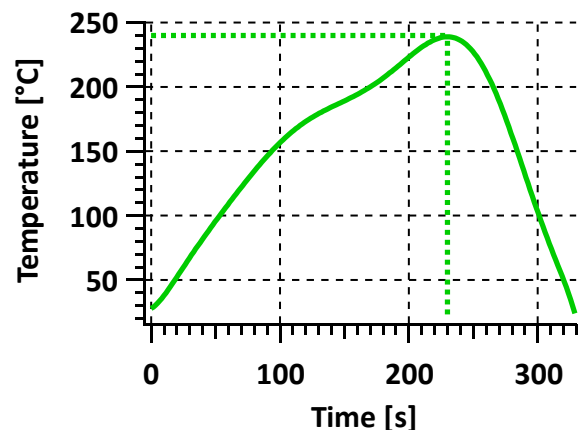
with q the charge carrier and P the incident optical power in W.

Note 2: The NEP is specified in dark conditions and defined as $NEP = \frac{i_N}{R(\lambda)}$

Table 8: Reflow Solder Profile

The following reflow solder profile is a typical used profile for SAC305 solder alloys. Specific solder parameters depend on the solder alloy used.

Profile Feature	Symbol	Typical	Units
Minimum Sparkling Temperature	T_{Smin}	150	°C
Maximum Sparkling Temperature	T_{Smax}	200	°C
Sparkling Time	t_s	75	s
Minimum Reflow Temperature	T_L	217	°C
Peak Temperature	T_P	244	°C
Reflow Time	t_L	65	s
Time within $T_P - 5^\circ\text{C}$	t_p	25	s
Ramp Down Rate	ΔT_c	2	°C/s



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Figure 1: Mechanical Dimensions

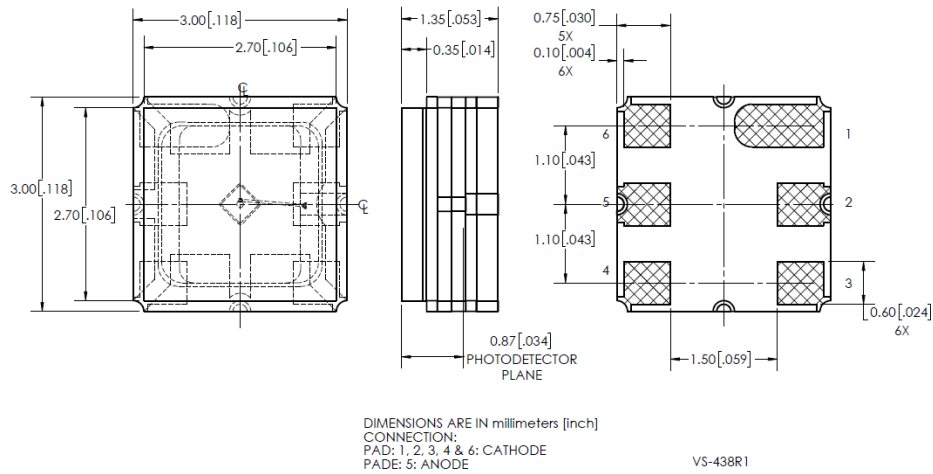


Figure 2: Typical Quantum Efficiency and Typical Responsivity vs. Wavelength

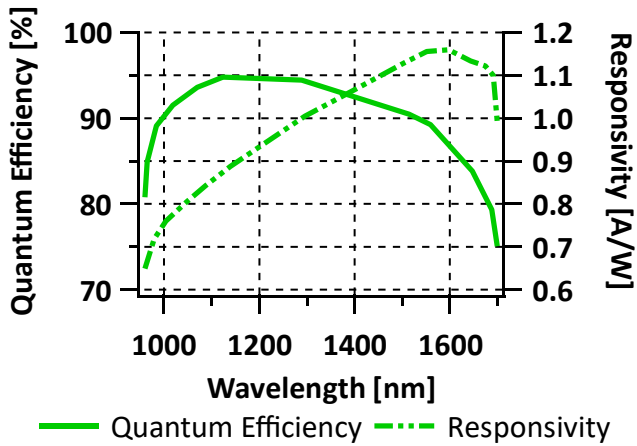


Figure 3: Typical Capacitance vs. Reverse Bias

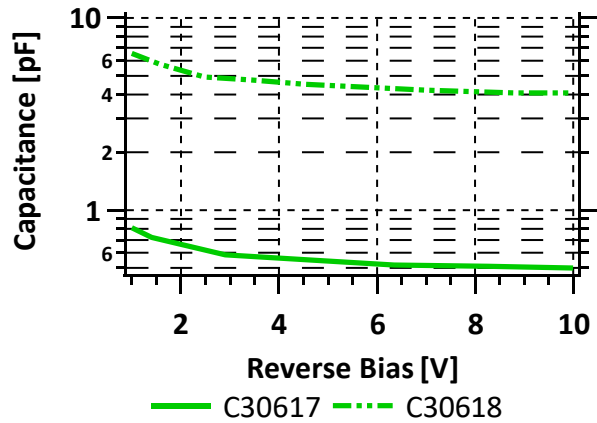
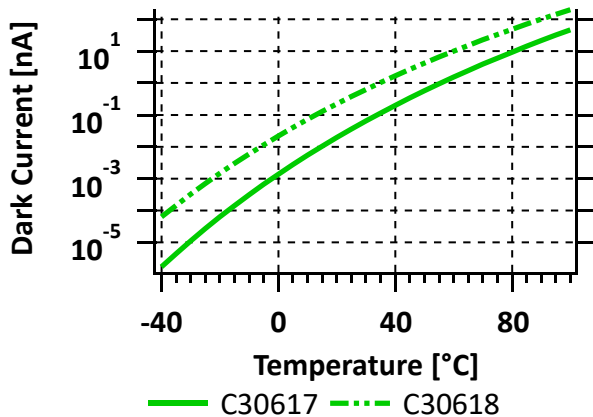


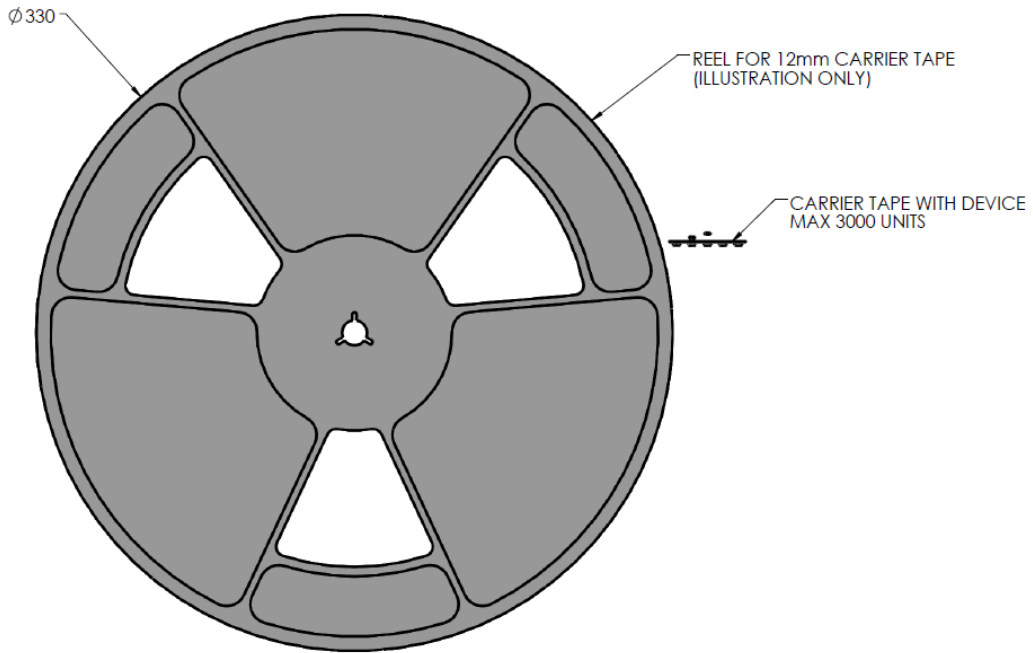
Figure 4: Typical Dark Current vs. Temperature



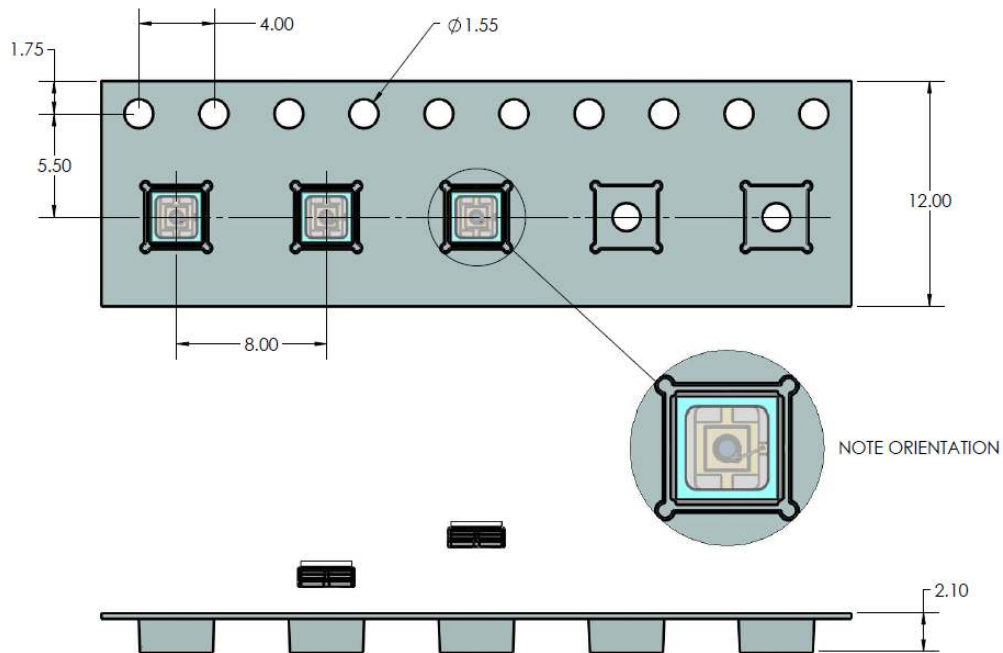
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Figure 5: Tape and Reel Packing Specification



VS-542 (C30737LHTR)
DIMENSIONS ARE IN MILLIMETERS
AND ARE FOR REFERENCE ONLY



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Information

Excelitas Technologies' C30617L-100 and C30618L-350 PIN Photodiodes are high-speed InGaAs detectors. They are specially designed for OEM applications as fiber-optic communication systems and high-speed receivers, including trunk line, LAN, fiber-in-the-loop and data communication.

The ceramic surface mount package allows for easy integration into high speed SONET, FDDI or data link receiver modules, as back facet power monitors, optical time-references for laser range finders, or in high volume consumer wearable applications.

Recognizing that different applications have different performance requirements, Excelitas offers a wide range of customization of these photodiodes to meet your design challenges. Responsivity and noise screening, custom device testing and incorporating band pass filters are among many of the application-specific solutions available.

Testing methods

Excelitas verifies the electro optical specifications on every device. Visual inspection during fabrication is performed as per our quality standard and failed devices 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

All C30617L-100 and C30618L-350 PIN diodes are offered in tape and reel shipping pack for quantities of 3000 units per reel; as shown in Figure 5.

For sampling quantities the diodes are shipped in Gel Pack packages.

Storage and handling

Excelitas highly recommends to follow the below notes:

- Keep devices in an ESD controlled environment until final assembly.
- Keep Tape & Reel package closed until final assembly.
- Remove Devices from Tape & Reel by using a vacuum pick-up tool.
- If a manual picking method is necessary, use a vacuum pick or non-metallic tweezer.

MSL rating

The series of PIN diodes comply with a moisture sensitivity level (MSL) rating of 3 as defined in IPC/JEDEC-J-STD-033C. This allows for up to 168 hours floor life at $\leq 30\text{ }^{\circ}\text{C}$ / 60% RH once removed from the sealed reel packaging. For complete details refer to the IPC/JEDEC-J-STD-033C specification.

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RoHS Compliance

This series of APD diodes are designed and built to be 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. 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.

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.

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