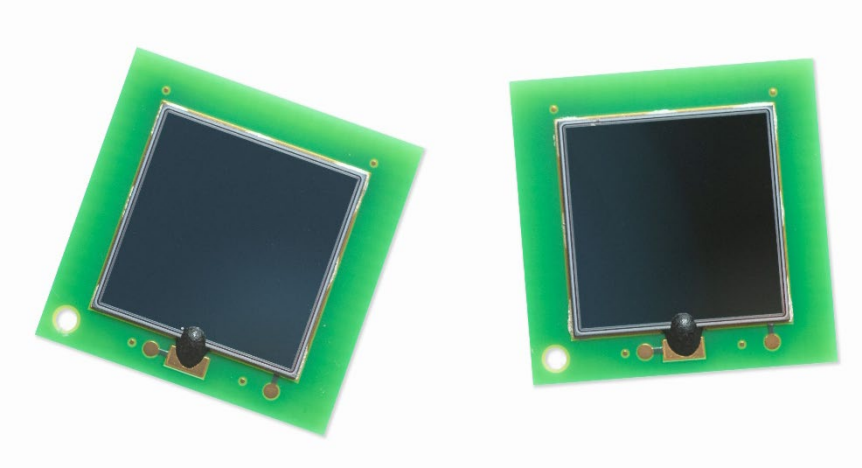
VTH3020 – Chip-on-Board (COB) Si Photodiode

Large Area COB Detector for Alpha Particle Detection



Excelitas' VTH3020 Chip-on-Board Silicon Photodiode is a large area, low noise, low capacitance detector optimized for Alpha particle detection.

Key Features

- 10mm x 10mm Active area
- Low dark current and noise
- High breakdown voltage
- Low capacitance
- Reflow solderable
- RoHS compliant

Applications

- Alpha Particle Detection
- Radon Gas Detection
- Particle and Photon Detection applications

All specifications are referring to an ambient temperature of T_A = 22 °C, unless otherwise specified.

Table 1: Key parameters

Parameter	Symbol	Min	Typ	Max	Unit
Dark current (V_{rev} = 20V)	I_D			10	nA
Breakdown Voltage (Irev = 100uA)	V_{BD}	50			V
Junction Capacitance (V_{rev} = 20V)	C_J			120	pF
Depletion layer thickness (V_{rev} = 20V)	t	0.09			mm
Dead layer (Si equivalent)	t_d			150	nm

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Table 2: Chip Dimensions

Parameter	Value	Unit
Active Area	10 x 10	mm
Chip size	10.68 x 10.68 x 0.3	mm

Table 3: Absolute Maximum Ratings

Parameter	Symbol	Value	Units
Storage Temperature	T_S	-40 … +100	°C
Operating Temperature	T_{Op}	-40 … +100	°C
Maximum Humidity (non-condensing)	RH	60	%
Soldering Temperature	T_{Peak}	245	°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.

Table 4: Other Electro-Optical Specifications

Parameter	Symbol	Minimum	Typical	Maximum	Units
Operating Voltage	V_{Op}		10		V
Forward Voltage (I_F = 10mA)	V_F	0.4		1.2	V
Spectral Range	Δλ	400		1100	nm
Peak Responsivity	λ_{peak}		925		nm
Responsivity (at 925nm)	R		0.7		A/W

Testing methods

Excelitas verifies the electro optical specifications of every device at 22 °C.

Visual inspection during fabrication is performed as per our quality standard and failing diodes are removed.

The following parameters are part of Excelitas testing procedures:

- Breakdown Voltage (Sample basis)
- Junction Capacitance (Sample Basis)
- Dark Current (100%)
- Forward Voltage (100%)

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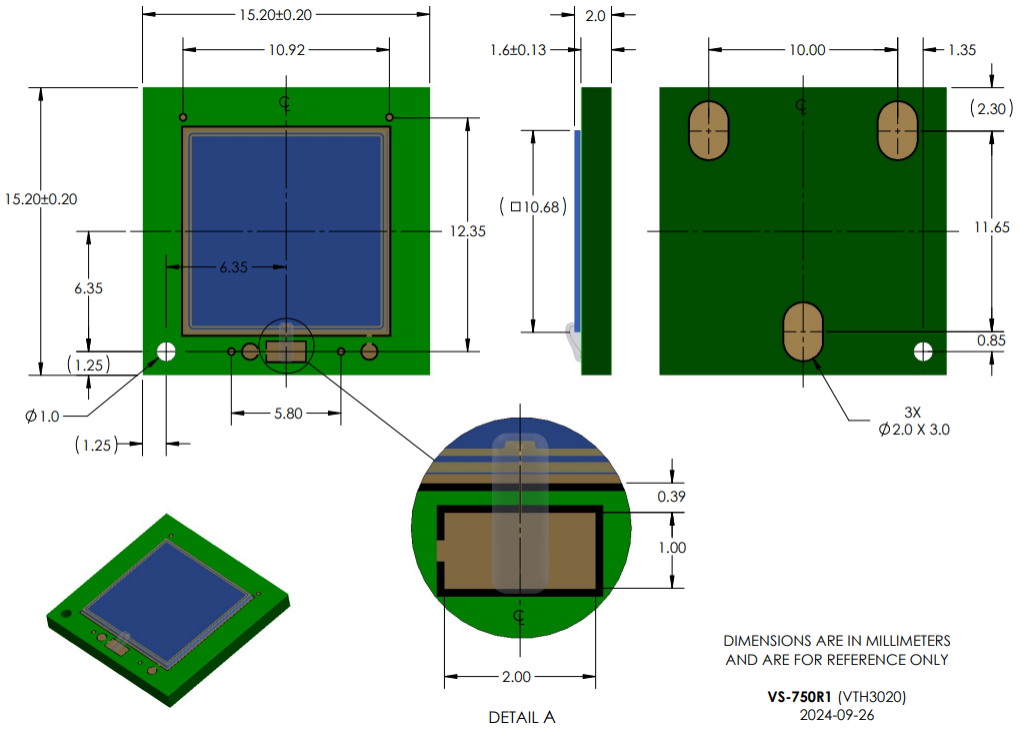
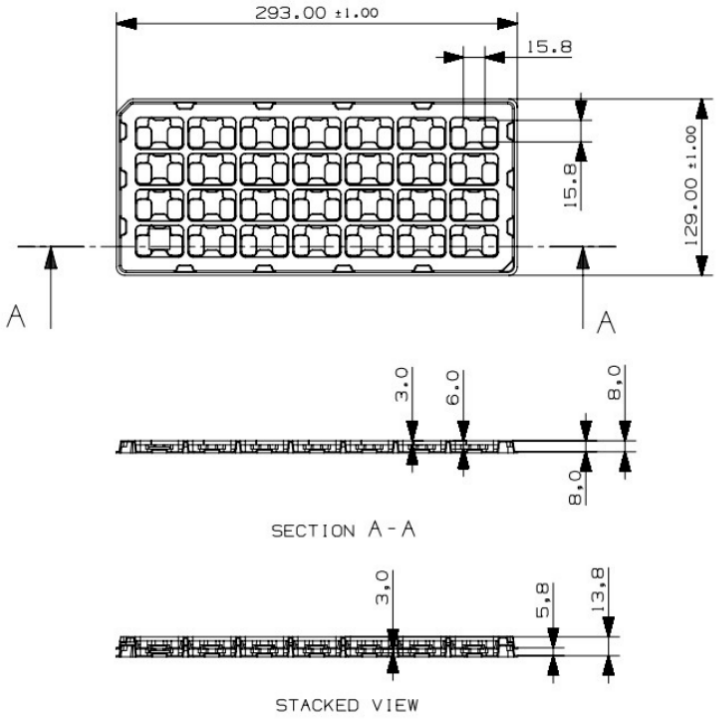
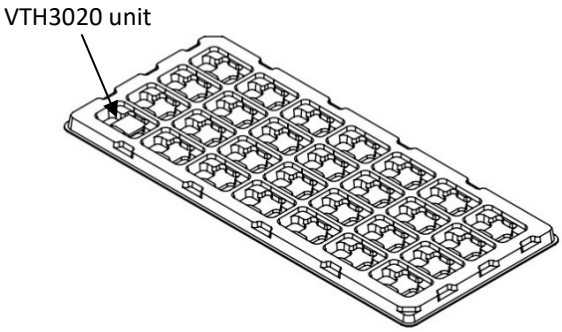
Mechanical Characteristics



Packaging and shipping

The VTH3020 devices are shipped in vacuum-formed trays (VFTs) and put inside Moisture-barrier bags. The VFT dimensions and placement of unit is shown below. Maximum of 28pcs per VFT.

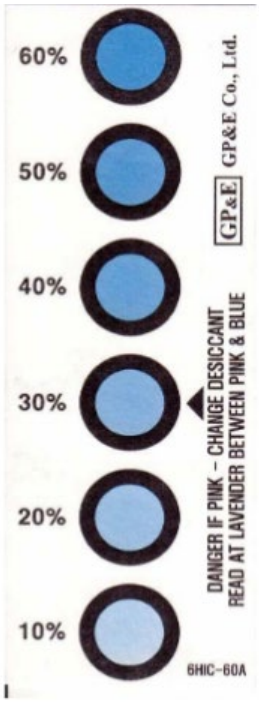




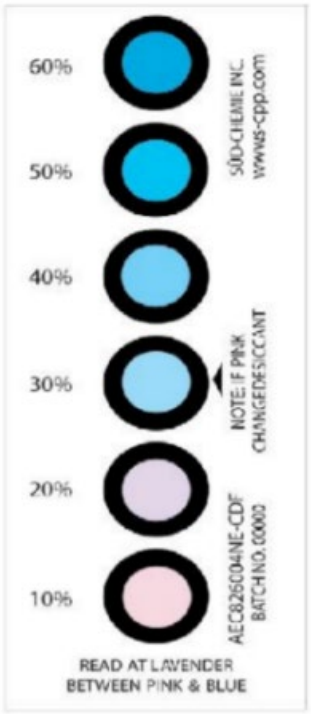
MSL Rating

The VTH3020 device is MSL 4 rated. Prior placing on Vacuum-formed Tray (VFT) and inside Moisture Barrier Bag (MBB), the devices are baked to remove moisture. After placement inside the MBB, it is vacuum-sealed to prevent moisture ingress up to the time the MBB is opened at the customer. A humidity indicator card (HIC) is placed inside the MBB. The HIC shows bluish color at the 6 different moisture indicator spots (see GOOD HIC picture below). Once the MBB is opened, reflow soldering using the recommended profile above should be performed within 72hrs. If reflow soldering wasn't done within 72 hrs after MBB opening, or if upon MBB opening, the HIC inside shows pinkish color at 10% (as shown below for the REJECT HIC picture), then the devices should be removed from the VFT and baked at 115°C for 16 hrs. After baking, the modules should be reflow soldered within 72hrs.

Good HIC



Reject HIC



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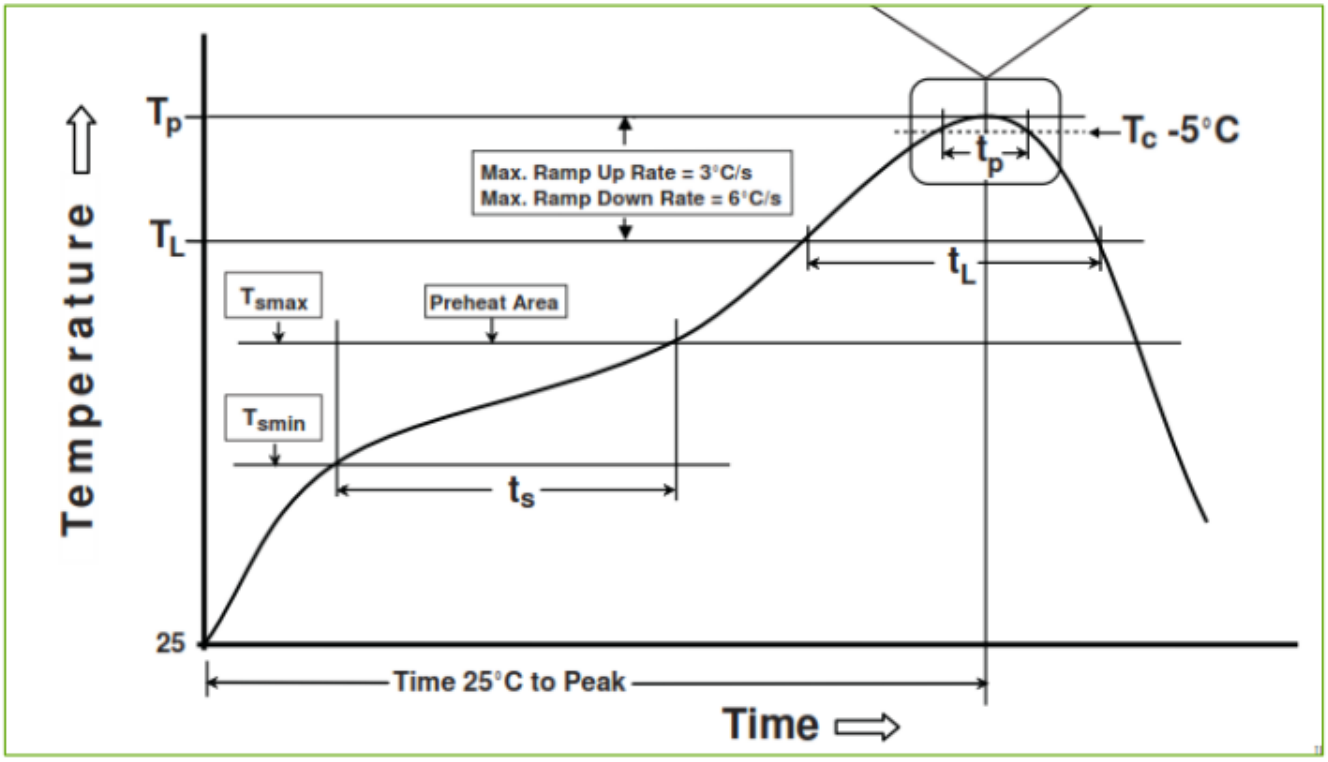
Recommended Reflow Soldering Profile:



Profile Feature	Symbol	Value	Units
Pre-Heat			
Temperature min	Ts_{min}	150	°C
Temperature max	Ts_{max}	200	°C
Time (Ts_{min} to Ts_{max})	t_s	75	seconds
Temperature maintained above	T_L	217	°C
Time maintained above T_L	t_L	65	seconds
Peak Temperature	T_P	244	°C
Time within 5°C of the actual peak temperature (T_p)		25	seconds
Ramp down rate		2	°C/second
Time25°C to Peak Temperature		4	Minutes

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RoHS Compliance

This series of Photodiodes is 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.

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.

Disclaimer

The specifications inside this document are referred to as “Engineering specifications”. The above mentioned part is currently under development and has not been qualified completely. Therefore, sampling of the part is only possible for functional tests and reliability testing must not be carried out on parts based on an engineering specification. Please contact Excelitas Technologies for more information and updates on specification parameters

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