

JEC Series

SiC Ultraviolet Photodiodes

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Boston Electronics's Silicon Carbide (SiC) photodetectors are photovoltaic devices similar to silicon solar cells, and need no external power supply (bias) to operate. Only light shorter than a wavelength of ~400 nm is absorbed and produces photocurrent. Consequently the devices are intrinsically nearly-blind to sunlight and to artificial room lighting. Versions incorporating UV-A, UV-B, UV-C, and UV-BC (B&C bands combined) optical filters are standard products. See curves on the following page. Custom UV filters are available on request. Filters for SiC photo-detectors are simpler to construct than filters for detectors with longer wavelength response (like silicon), so they are less expensive, more transmissive, and contribute less to measurement uncertainty due to out-of-band light leakage than the equivalent filters for silicon detectors.

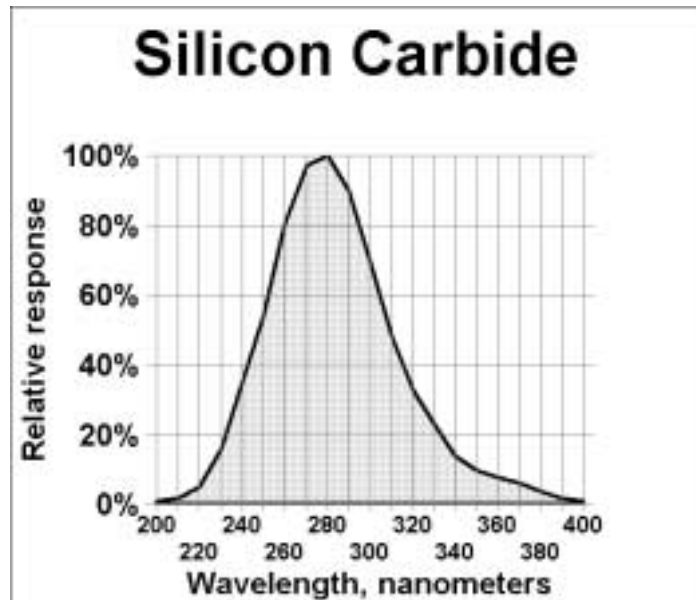
Noise in these devices is extremely **LOW**. Measured noise will normally arise in the following signal processing electronics rather than in the photo-detector itself. Achievable signal-to-noise ratio will be determined from detector signal divided by electronics noise.

Electronics required to amplify or display the signal of these devices is identical to electronics for silicon photodiodes. For example, Burr-Brown OPA111 is a convenient IC.

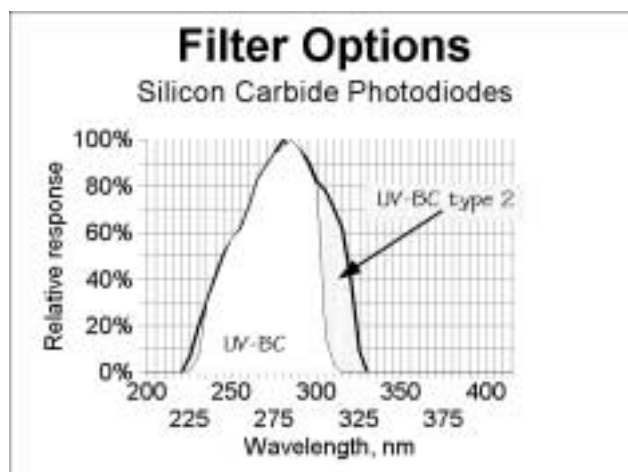
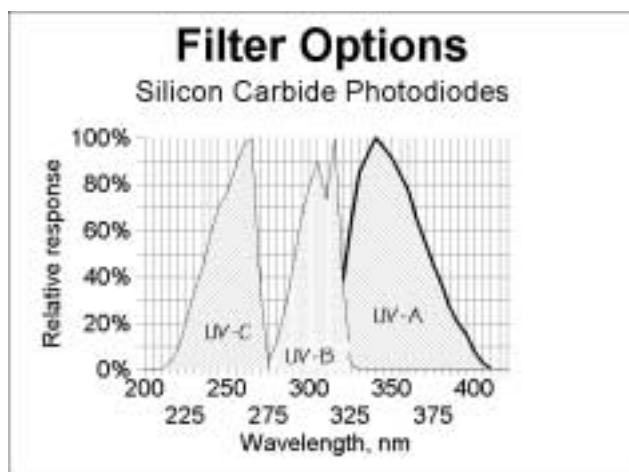
Silicon Carbide UV photodetectors will survive and operate at **high temperatures**. NEW packaging (suffix 'HT') now allows us to warrant device survival and operation at up to 150C. Standard devices are limited by the packaging to <100C continuous exposure. High-speed multi-megahertz operation is possible.

Available sizes are 0.25x0.25 mm, 0.5 x 0.5 mm (NEW), 1x1 mm and 2x2 mm.

Applications include UV lamp and exposure control, flame detection, combustion control, and Beer's Law experiments in the concentration of biological unknowns.



Spectral response with UV-C, UV-B, UV-A and UV-B&C combined filters are shown below



Sensitivity: These devices are normally limited in signal-to-noise ratio by the noise of the electronics, since the SiC devices themselves are VERY low noise. Therefore calculations of signal-to-noise ratio usually requires consideration of noise in the electronic signal chain following the device. Boston Electronics is available to consult on this issue.

Model	Area (mm ²)	Spectral Range (~10% pts, nm)	Peak Signal (A/W @ nm)	Dark Current @ -1V Bias (fA)	Output in bright sunlight (nA)	Capacitance (pf)	Speed (Mhz @ -3dB)
JEC 0.1 S	0.25 x 0.25	210 to 380	0.13 @ 275	0.2	50	20	100
JEC 0.3 S	0.5x 0.5	210 to 380	0.13 @ 275	0.4	300	60	50
JEC 1 S	1 x 1	210 to 380	0.16 @ 275	1	1,000	195	20
JEC 4	2 x 2	210 to 380	0.16 @ 275	5	5,000	700	10

Filtered versions also are available. Replace the ___ below with above size number

JEC __A	Any	335 to 395	0.04 @ 340	As above	As above	As above	As above
JEC __B	Any	280 to 325	0.08 @ 315	As above		As above	As above
JEC __BC	Any	230 to 305	0.12 @ 285	As above		As above	As above
JEC __BC2	Any	225 to 320	0.12 @ 280	As above		As above	As above
JEC __C	Any	220 to 275	0.10 @ 265	As above		As above	As above

Packaging and preamps: These devices are available in TO-18 and TO-5 window packages . They are also available with high-gain hybrid preamps with response to a few kHz inside the TO-5 package. Stand-alone high frequency low noise preamps also can be provided.

For more information please consult: IEEE Transactions on Electron Devices, Vol. 40, No. 2, Feb. 1993, p 325..., "Silicon Carbide UV Photodiodes", D. M. Brown et al...

