

Modules Protects 5-V And Lower Designs From Overvoltage

[Advanced Linear Devices'](#) SABMBOVP family of overvoltage protection PCBs is said to offer the first-to-market low-power, low-voltage, high-precision voltage-clamp module (see the figure). These modules are well suited as clamping solutions for mission critical applications deployed in business, safety, and security products that are 5 V or below. When these systems fail or are interrupted, operations may be significantly impacted. These ultra-low-voltage designs are increasingly used in a variety of applications, including industrial IoT, banking, transportation and power systems.

Low-voltage circuits are at risk of overvoltage failure from transient voltage spikes from sudden load changes or high transient energy levels, which can radiate throughout the system and cause damage. Now low power designs can guard against failure by using an overvoltage protection circuit or a voltage clamp, which is a circuit designed to limit the output voltage to a specific range.

ALD's SABMBOVP circuit board series protects from overvoltage by using very low-voltage precision enhancement-mode MOSFETs to improve the clamping function. ALD's proprietary EPAD technology was developed for low-voltage, low-power, high-precision linear applications. Stacking various SABMBOVP channels in series can realize different combinations of clamp voltages.

Both the SABMBOVP and the Zener diode options monitor the input voltage and control the external transistor switch's gate without affecting the load circuit's operation. The overvoltage protection circuit disconnects the load during the transient event, whereas the voltage clamp continues to power the load but clamps the voltage so as not to exceed a predetermined voltage. Even precision Zener diodes have high leakage current and imprecise voltage ratings. Metal oxide varistors (MOVs), and most transient voltage suppressor (TVS) devices, are also impractical to control voltage spikes as they breakdown when voltages drop below 5 V.

Compared to a Zener diode clamp, this circuit, at <100 nA max, has a significantly lower quiescent current than the low-voltage Zener. It also has a better voltage-versus-current (I-V) characteristic and more precise voltages than the Zener alternative. Another benefit is response time, which at <100 ns is better than when using a Zener diode. Also, the surge current handling capability of >100 mA is better.

In addition to clamping voltages well below anything achievable by a Zener diode, the ALD overvoltage protection clamps are self-contained. They do not require additional components, such as a resistor divider, amplifier buffering circuits, and voltage regulator circuits, required by Zener diodes. This reduces complexity for the user as well as lowering power consumption.

Each ALD board provides two identical clamp voltage channels. The ALD SABOVP can be used as independent clamps, or they may be stacked to double the basic clamp threshold voltage. The clamp voltages on a single device will be identical, different boards with different clamp voltages can be added to the stack. The parts are currently in stock at [Mouser](#) or [DigiKey](#) with pricing beginning at \$12.81 to \$20.54 each.



Figure. ALD's SABMBOVP2XX family of overvoltage protection printed circuit boards consists of innovative circuits designed to provide precision overvoltage protection in stacked supercapacitor voltage balancing and other voltage clamping applications. The SABMBOVP2XX circuit can be viewed as a precision voltage clamp circuit that offers a superior zener-diode type of functionality and performs to superior specification and characteristics in creating a strong, precision voltage clamp. Typically, the clamp current changes from a few nanoamps to over 100 mA at the clamp voltage within a 100-mV transition.