Thank you for your interest in Nanolog Devices (NDs). NDs are carbon-based two-terminal devices that have non-linear electronic properties that can be used to create really cool distorted sounds. Here, you will find information on what kinds of applications and circuits NDs have been tested in, and what kinds of other applications you might develop using them. ND's can be packaged in TO-cans or SIM cards. TO-cans hold one ND, whereas SIM cards may hold up to two. We use Amphenol FCI 7111S2015X02LF holders for mounting.

Figure 1. Photo of a Nanolog Device in a TO can format. Cans numbered 1-25 are N1 devices, while 26-50 are N2, corresponding to the IV curves in figure 2 below.

Nanolog Devices have two-terminals, and act as drop-in replacements for an anti-parallel diode array. The electronic symbol for a Nanolog Device is: —(N)— and it can replace —▷|◁—

Nanolog Devices are symmetric; they conduct equally in both directions, but do so in a non-linear way. In addition, they are made from aromatic carbon that has hexagonal rings within their structure. The *i-V* curve of the two Nanolog Devices are plotted below in Figure 2, where the current flow is measured between the two terminals of the device as a function of the applied voltage. The *i-V* curve is important for determining the exact character of distortion or clipping that will result, and will have important consequences on the design of a circuit for a targeted application.

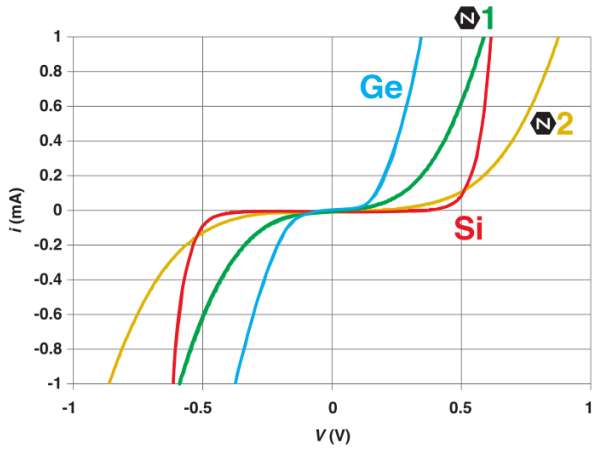

Figure 2. Current-voltage (*i-V*) curves of pairs of Si diodes (red, 1N4148), Ge diodes (blue, 1N34A), and two Nanolog Devices (green, N1, and orange N2), showing the non-linear responses.

In order to use the non-linear *i-V* curve of a Nanolog Device for distortion, some type of amplifier needs to be used. There are several options, and depending on the needs and intention of the circuit, this is where Nanolog Devices can really shine - by being incorporated into classic circuits to bring out a new element, or by serving as a design centre-point for unique sounds.

Please note that all circuits listed below have been tried and we have verified that Nanolog Devices will operate within them. However, there are a number of other circuits which could be investigated that will also work. Experiment!

IMPORTANT POINTS: Avoid designs where the Nanolog Device will be subjected to DC biases! They should work fine for AC voltages up to 1 V throughout the audio frequency range. In addition, we have tested the circuits using 9 VDC power supplies only so far, so it is a good idea to stick with designs that use the same. As we move forward, we will have more information available.

In any application, it can be a good idea to rig a switch that allows direct comparison of the Nanolog Devices to a standard pair of clipping diodes, in order to fine-tune the circuit, or to provide for a quick contrast.

Please address any questions about Nanolog Devices and/or circuit applications to Adam Bergren ajbergren@nanologaudio.com

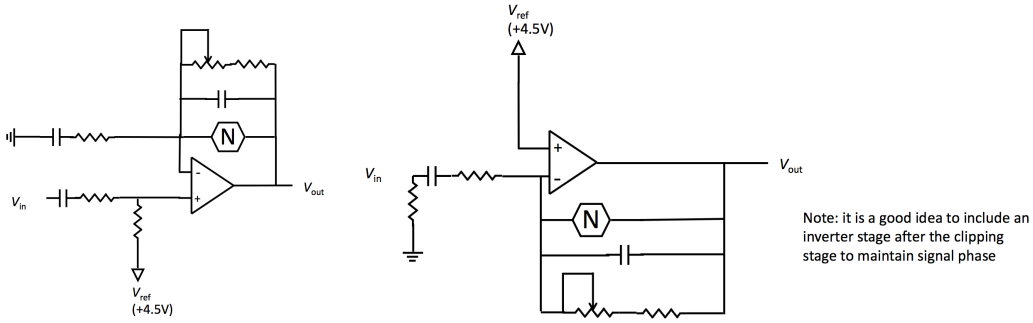

Figure 3. (Left) Non-Inverting op-amp soft-clipping stage, and (Right) inverting op-amp soft-clipping stage. These both utilize feedback-loop based clipping configurations where the non-linear Nanolog Devices shape the voltage waveform. The choices of R and C values will depend on the intent of the design, and are left blank.

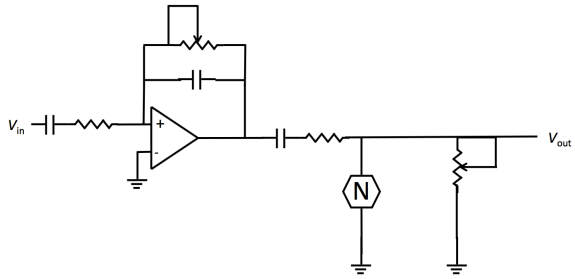

Figure 4. Non-inverting op-amp with a hard-clipping shunt clipping stage. The choices of R and C values will depend on the intent of the design, and are left blank.

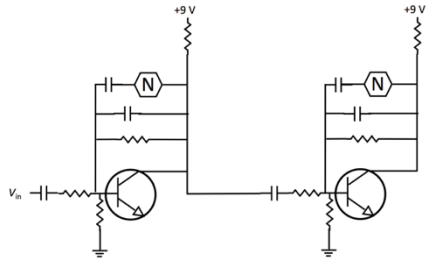

Figure 5. NPN transistor based hard clipping circuit with two series stages. The choices of R and C values will depend on the intent of the design, and are left blank.